RAILROAD GAZETTE

FRIDAY, DECEMBER 18, 1896.

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Contributions.

A Clever Device in Filling a Trestle.

NEW YORK, Dec. 11, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Dec. 11 you show a photograph, "Filling a Trestle," and state that under the specifications all boulders were excluded, but that it is obvious from the photograph that boulders could not always be kept out.

The statement does not do justice to the ingenuity of the contractor and the success of his method. The specifications stated that all boulders were to be excluded, this provision having been introduced as the only material that could be economically obtained for filling the trestle was found at a bank in which occurred a large number of boulders. The contractor requested that this part of the specifications be so modified as to permit him to use the boulders, he assuming all liability in regard to damage to the trestle. The device that he used was eminently successful, the material as it came from the shovel being screened, but boulders of considerable size being allowed to go into the bank. These boulders, however, in all cases were deflected by means of the screen and carried out to the edge of the embankment, where they were used as a protection. The part of the bank on which the load rested was composed almost entirely of fine sand. WM. BARCLAY PARSONS.

Green Lights—and Some Other Things.

TAUNTON, MASS., Dec. 15, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Such strong arguments as those presented in your columns against the use of white lights in semaphore signals could not fail to take effect sooner or later (though most superintendents and signal engineers have expected it would be later rather than sooner) and your readers will perhaps be surprised to hear that signs of action appear first in the conservative East. The leaven is working, but not as yet in the most satisfactory manner. As an overdose of yeast in the hands of an inexperinced cook makes the bread burst its bounds so the leaven of logic has here led to a result that will make it necessary sooner or later to try over again.

A prominent railroad in this state has put up a signal with a green light for all-right and a red one for danger, but has followed the English idea of making the distant signal precisely like the home; and has disregarded the plain lessons of experience, both in England and in this country, by omitting to interlock the distant with the home. What do you think of that? And the rule requires trains to *stop* at the distant signal when it shows red. Just as the Englishmen are beginning to see the absurdity of this antiquated rule, we Yankees are taking it up!

Verily the locomotive engineer can continue to assert that he is the chief man on any railroad, and that therefore he is truly the hero of the rail. In the old times he was required to run without any signal at all and to be responsible for safety and for reaching the end of his trip on time, in spite of careless flagmen, of freight conductors with poor watches and of section masters who notified him of washouts or not, just as they happened to see fit. Those conditions are now mostly done away with, and many improvements have been introduced; but here we have a modern combination which demands impossible things of the engineers in a way as perplexing as any of the old-time crudities (altbough I say "modern" I cannot say "novel" for equally defective conditions exist in other places). The engineer must be able to stop at a distant signal without receiving advance information of how he may expect to find it, and yet he must *make time*; and making time is no easy thing nowadays. Although powerful engines are provided, the weight of the cars and the required speed are increased, and the engineer's task is more difficult than ever. Can there be any doubt how he will meet it? When in doubt, on account of a poor view of a distant signal, he will take chances. And, as of old, if he is alert and cautious he will probably stave off the day of disaster so long that the officers of the road will go to sleep in the confidence that they have "the best runners in the country." Which way is the art of signaling progressing, backward or forward?

L. M. A.

[The art, or science, of signaling is progressing, and progressing in the right direction. This, we have no doubt, is the right answer to the question of our correspondent, though he seems to expect us to say that the contrary is true. The thing described in his letter must be an experiment; and if it is intelligently followed up, it will probably lead to something better. The signal engineer who made it evidently aims to cure an admitted defect in the ordinary plan of signaling, and that is a laudable motive. Massachusetts was the scene of a derailment, recently described in these columns, which was due to a broken red glass; it may be that that is what started this movement for a change. As for practice under this signal, as it is described, the most that can be said is that, if the superintendent desires to continue it in peace, he should thank his stars that he is in New England instead of Old. A distant signal not interlocked would be held by the British Board of Trade sufficient reason for declaring a railroad not entitled to the government certificate authorizing it to run trains. A rule making the distant a stop signal is sure to make trouble with fast trains either in England or America; but unfortunately it seems to be easy in both countries to keep rules on the book for years while constantly winking at their violation. In the case of this particular rule the winking process has been going on so long that it has on some roads become a profound slumber. At least, so it appears.—EDITOR RAILROAD GAZETTE.]

Cast Steel in Locomotive Building.*

Paper by Mr. Sague, Mechanical Engineer of the Schenectady Locomotive Works.

One of the most interesting of the recent developments in locomotive construction has been the increasing use of cast steel, and before taking up in detail the advantages gained, it may be of value to mention the general reasons which have led to its wide substitution for cast and wrought iron. These reasons are, first, a desire to use as large a boiler as possible and the consequent lightening of the other parts as much as strength and durability will permit; second, the growing need for a stronger material than cast iron to withstand the increased strain of the large cylinders and high steam pressures used in modern locomotives; third, a desire to lighten reciprocating parts and thus reduce the effect of reciprocating counter-balances on the track; and, fourth, the substitution of cast steel for difficult and expensive forgings, which has been rendered possible and economical by the decrease in cost of steel castings and the improvement in quality. In this connection the following is quoted from a letter received from the American Steel Casting Company:

"The main point of advantage in the use of steel castings as a substitute for cast iron is the great saving in weight; and as a substitute for forgings is a saving in machine work, due to being able to cast close to finishing sizes."

The necessity of obtaining the maximum of power with the minimum of weight is the feature of locomotive designing which, perhaps, involves the greatest difficulty and requires the most careful consideration of any condition by which the locomotive designer is limited, and in this locomotive designing differs radically from that of stationary engines. . . . For most passenger service, at least, the ability of the locomotive to do work is limited by its boiler capacity, and it is believed that the great demand upon the boilers of modern locomotives has been caused more by the increase in train speeds than by the increase of weights. With the maximum loads permitted on the rail it is often very difficult to use boilers large enough to do the work required, and it is necessary for the locomotive designer to lighten parts wherever possible in order to make up for the weight which must be put into the boiler. It is this necessity more than any other which has led to the increasing use of cast steel in locomotive construction.

The demand for a stronger material than cast iron, to withstand the strains of large cylinders and high steam pressures, has also been notable. The increase of strain due to high steam pressure is clearly shown from the fact that a 19 × 24-in. cylinder with 180 lbs. of steam has more power than a 21 × 24 in. with 145 lbs, the higher steam pressure corresponding in this case to an increase in power of 24 per cent. Increasing the size of parts to correspond with such increases of power is difficult in many cases, and with cast iron, unfortunately, increase of section does not mean an equal increase of strength.

The necessity of reducing the weight of reciprocating parts as much as possible does not need to be dwelt upon, and cast steel enters largely into the construction of the light reciprocating parts used in recent locomotives.

The superiority of cast steel over wrought or cast iron in strength and ductility is seen from the following tests taken from the records of the testing department of the Schenectady Locomotives Works. Average results from 140 tests taken from cast-steel wheel centers applied to passenger and freight locomotives; tensile strength, 71,400 lbs per square inch; elongation, 19.2 per cent. in 8 in. and 24.1 per cent. in 4 in. In each case the test pieces were cast on the wheel, one test piece representing each center. The record of tests also shows the location of the wheel centers for each engine.

* An abstract of papers and discussion at the November meeting of the New England Railroad Club.

For comparison it may be said that first-class cast iron has an average tensile strength of from 20,000 to 30,000 lbs. per square inch with practically no elongation, and wrought iron a tensile strength of 48,000 to 50,000 lbs. with an elongation of 20 per cent. and upward in 8 in. The figures thus show that cast steel suitable for locomotive use has nearly three times the tensile strength of cast iron and 50 per cent. more than wrought iron. It also has the great advantage of high ductility, being nearly equal in this respect to wrought iron.

In order to realize the full benefit of the great strength of cast steel, however, much care must be exercised in the designing and manufacture of the castings. Cast steel has 50 per cent. more shrinkage than cast iron, and is much more liable to unequal shrinkage strains, which, unless carefully provided for, will more than offset the high tensile strength. It is the practice of the works with which the writer is connected to ask the criticisms of the steel-makers upon the design of difficult castings, such as wheel centers, and modify the distribution of metal accordingly. In general it may be said that the rules for correct proportioning of iron castings, regarding uniformity of section, large fillets, etc., apply with greater force to cast steel.

The use of cast steel as a substitute for cast iron generally increases the first cost of locomotives, the cost of the process and greater percentage of loss making the price per pound about three times that of cast iron, against which the saving of weight in most castings is only a small offset. The cost of machining is also considerably greater than for cast iron, as more finish is required to allow for unequal shrinkage, and the hardness and toughness of the metal requires the machines to be run at low speeds with light feeds, thus increasing the cost of labor and lessening the output of the shop. In some cases, however, steel castings may be substituted for difficult forgings with a saving in first cost, but thus far this has only proved true for locomotive use in a few cases and with small forgings.

Steel castings are used in this country more or less extensively for the following locomotive details: driving-wheel centers, driving boxes, cross-heads, frames, pistons, expansion pads and knees, dome rings, rockers and foot plates.

The substitution of cast steel for cast iron for driving-wheel centers in American locomotives has been very recent. The first steel centers applied by the Schenectady Locomotive Works were put in service May 1, 1895. Since then 500 wheel centers have been used in passenger and freight service, including locomotives now under construction. Thus far the principal use for steel driving-wheel centers has been for large passenger engines, but quite a number have been applied also to freight engines. For passenger locomotives the main advantages of steel are its decreased weight and greater strength. A photograph which I have with me shows cast iron and steel centers 62 in. diameter, designed for the same service, the saving in weight with the steel being about 610 lbs. per center, or a total saving for a four-coupled engine of 2,440 lbs. I also have blueprints with me of different designs of steel driving-wheel centers applied to passenger and freight engines. The strength and shock resisting power with the steel centers, even with a lighter weight, is undoubtedly very much greater than that of cast iron; in fact, with sound castings, free from shrinkage strains, it is difficult to see how a steel center can be broken except in a wreck. Great care, however, must be taken to avoid shrinkage strains. The rims are split in four places, which are carefully slotted and fitted tightly with planed cast-iron plugs driven in so that the shrinkage of the tire will make the rim practically solid. Great care must also be taken in pouring the metal and while castings are cooling. The steel makers say, for instance, that the baked moulds are so hard and unyielding that if the sand is not broken away almost immediately after pouring, shrinkage flaws are almost certain to develop. An incidental advantage of steel centers, which is appreciated by the engineers, is the chance given for oiling and inspection through the large spaces between the spokes and around the hubs.

A difficulty involved in the use of cast-steel centers is the necessity of providing for hub wear, as it is well known that cast steel does not wear satisfactorily against cast iron. This has been provided for by the use of cast iron or bronze hub liners, or a facing of babbitt or bronze on the driving boxes. Babbitt and cast steel are said to wear well together. Thirty locomotives recently built at Schenectady for the New York, New Haven & Hartford Road, with steel wheel centers and driving boxes, had the driving boxes faced with babbitt, the hubs of the wheel centers being simply faced off as smooth as possible, and these are reported to be wearing very satisfactorily. Driving boxes faced with bronze are also said to wear well against cast steel.

Cast-steel driving centers for freight engines allow of a considerable decrease of weight, but the advantage of increased strength is probably of even greater importance, especially for the main wheels, as all six and eight-coupled engines must have the main rod connected to the outside of the crank-pin, thus exerting great leverage on the wheel center around the crank-pin hub. When made of cast iron these parts must be very heavy, and even when all possible has been done in design and material, cast-iron main wheel centers are liable to give some trouble from cracking on heavy engines. It is believed that this might be entirely overcome with well-constructed steel centers, and the lightening of the hub and rim which could be obtained would allow of increased counterbalance being put in the main wheel, as in small-driver engines, with cast-iron centers, the balance on main wheel must often be deficient.

For driving boxes, cast steel has thus far had but limited use in spite of its great strength and the trouble experienced with broken cast-iron boxes. Probably one of the main objections to a more extended use of steel boxes has been the fear of bad results from wear between the box and wheel hub, and at the wearing surfaces of the shoes and wedges. Babbitt or bronze facing, however, seems to settle the question of hub wear satisfactorily. The large steel driving boxes fitted up for the New Haven engines, before referred to, had no special provision made for wear against the shoes and wedges, and we are assured that the results in service have been most satisfactory. Assuming that the wear can be made satisfactory, it is believed that steel boxes are destined to be quite generally used. Compared with cast iron they give great strength and freedom from breakage, can be made to save considerable in weight, and the flanges can be reduced in thickness, if desired, and thus allow the shoes and wedges to be widened to give more wearing surface. Steel boxes, also, being much stiffer than cast iron, would have less tendency to spring when the brass is pressed in. As compared with solid bronze, steel boxes expand less with heat and can therefore probably be run with a closer adjustment of wedges. The following letter received from Mr. John Henney, Jr., Superintendent of Motive Power of the New York, New Haven & Hartford Railroad, gives very valuable information on the subject of the wear of steel boxes:

"In reply to your favor of the 5th inst., would say that we have used steel driving boxes for two or three years before we had the last new engines built at your works. We also used them with babbitt facing, same as those built at the Schenectady Locomotive Works, and find they work very satisfactorily indeed. We have no trouble from using the cast-iron wedges in contact with the steel driving box. These wedges are kept as close as they were formerly with the cast-iron boxes, and with better results. The babbitt facing on the boxes wears well. You can scarcely measure the difference after a year's wear, and a year's wear on these engines frequently means 120,000 miles."

Cast steel is more widely used for cross-heads than for any other detail in locomotive construction. Cross-heads, of course, should be made as light as possible consistent with ample strength and bearing surface, and the use of cast steel enables this to be done more effectually than with any other material. A photograph and drawing presented showed the latest pattern of cross-head used by the Schenectady Locomotive Works on 20 × 24 in. locomotives carrying 190 lbs. of steam. The wings and wrist pin are cored hollow, decreasing the weight about 50 lbs. as compared with a solid cross-head, without any sacrifice of bearing surface or practical decrease of strength. The total weight of this cross-head, fitted with bronze gibbs ready for service, is 157 lbs. The centers for the "H," or Pennsylvania Railroad, style of cross-head are also best made of cast steel, and it is believed that cast steel Laird cross-heads can be so designed that the objection to this type on the score of broken piston rods can be practically overcome, especially if the rods are made with enlarged cross-head fits.

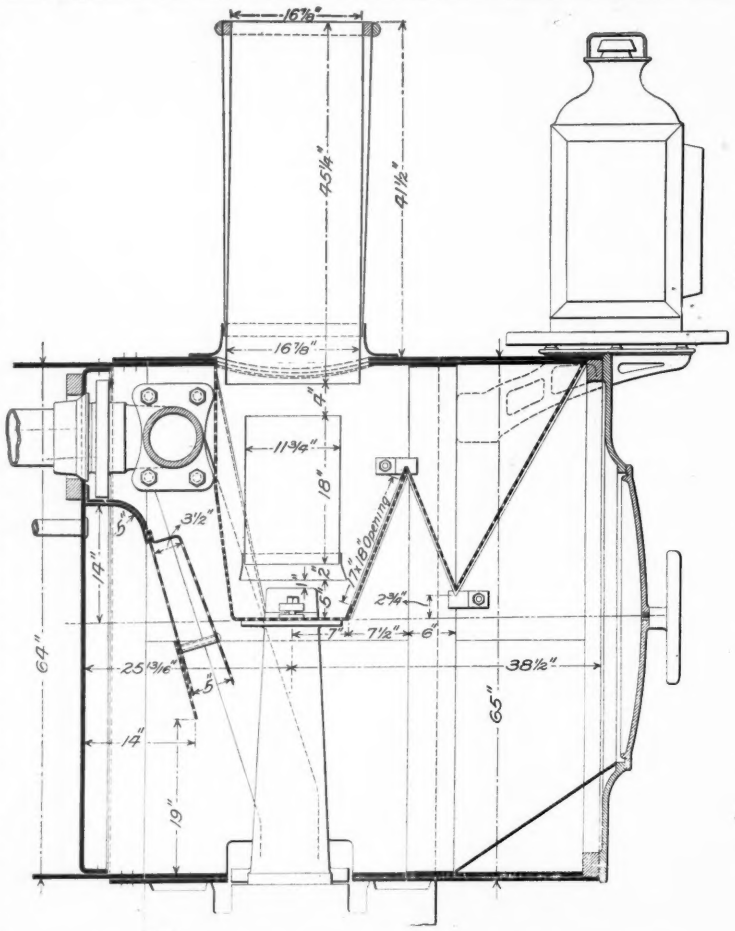
Cast-steel frames are as yet only matters of experiment and it is too early to give a very decided opinion regarding their advantages or otherwise, compared with hammered iron. The probable advantages that suggest themselves are as follows: All welds being avoided, the risk of breakage due to poor work is reduced, especially as the material in them is stronger and tougher than wrought iron. The Schenectady Locomotive Works, however, has long made it a practice to take three heats on each frame weld, and it is believed that this makes it almost certain that the frames are as strong at the weld as in any other part. Steel frames would admit of greater latitude of design than those of iron, as iron frames must be constructed with a view to easy forging and welding, and it seems probable that steel frames, if largely used, will lead to important modifications in design. It is possible, for instance, that the bars might be made of "T" or "I" section, thus reducing the weight without sacrificing strength. The weakest parts of wrought-iron frames, aside from possible defective welding, are through the bolt holes, and at these points the metal could be retained at full thickness and reduced elsewhere, thus keeping the net section nearly uniform. An objection to the use of cast steel which naturally occurs to one is the difficulty of repairing breakages. Cast steel in small sections can be successfully welded, but propably in larger sections the difficulty of securing a good weld will be much greater than with iron. I quote the following on this subject from a letter of the American Steel Casting Company:

"While we are strong advocates of cast-steel frames, our experience in this direction has been limited As a preliminary opinion, we beg to say that the substitution of cast-steel frames in the place of wrought forged would practically eliminate all objectionable features found in the wrought forged frames, and at the same time combine all their advantages. The price of cast-steel frames is an inducement, as we are able to furnish these frames at less money, either in the rough or finished, than that at which the wrought forged frame is being produced."

Dome rings made of cast steel have been largely used by the Schenectady Locomotive Works, and make a very successful job. In this case, however, it is being superseded by hydraulic flanged steel, which is believed to be the best of any material for the purpose. The use of steel in expansion pads and knees, foot-plates, guide yoke and bumper knees, frame filling pieces and similar locomotive details is constantly extending. The main object, as before mentioned, is to save weight for the purpose of allowing increase in the size of the boiler. In all these cases, of course, very considerable gain of strength is secured, which will result, no doubt, in decreased trouble from breakage, and the use of cast steel will probably extend to a great many other details than those mentioned. In English practice cast steel is used to a considerably greater extent than with us. Mr. Hughes' book on the construction of the modern locomotive speaks of 40 parts being thus made, among others, mud-rings, guide yokes for inside connected engines and crownbars. Even cast crank axles have been used to a very limited extent. . . .

Paper by Mr. Barba, of the Midvale Steel Works.

. . . Steel is now replacing iron in every part of the engine where shocks are most frequent and strains greatest. Tires, piston rods, connecting rods and axles, formerly made of iron, are now being made of steel, while for crank-pins demands are daily made for steel with qualities exceeding that required by the government for its very expensive ordnance. It is, therefore, somewhat strange that steel castings have been so long in obtaining from the railroads the recognition they really deserve. Satisfactory castings are not difficult to obtain; they are not a recent product, and the study of their manufacture by the best metallurgists of the country has brought it up to a remarkable condition of excellence. The first successful steel casting made in America was in 1867, and was a frog for the Philadelphia & Reading Railroad. This was made at the Midvale Steel Works by a man who has been continuously employed there in making steel castings from that time to the present. During this period there has been a steady advance in the character and quality of steel castings, in the grade of metal put into them and in general excellence of appearance. To-day steel castings may be obtained of a character and quality closely approximating ordinary forgings and far excelling in reliability and the amount of hard usage they will stand any iron castings produced. . . .



Section of Locomotive Front, Showing Arrangement of Bell's Spark Arrester.

With your permission we will compare an iron wheel center with a steel center: In the iron wheel you have a metal with a T. S. of say 25,000 lbs., and with no elasticity whatsoever; in the steel wheel you have a metal with an elastic limit of 35,000 lbs.—10,000 lbs., or 40 per cent. greater than the ultimate strength of the cast-iron wheel, while the ultimate strength of the steel wheel is 65,000 to 70,000 lbs., with an elongation after fracture of 20 to 30 per cent., a breaking strength two and one half to three times that of cast iron. . . .

Leaving the question of wheel centers for a moment, I would call your attention to the fact that cast steel is especially adapted for cross-heads, which you will agree with me is a vital point in an engine. Should a cross-head break in service, the amount of damage which might ensue is perfectly appalling to contemplate. Therefore the most careful attention of designers should be directed to securing simple, safe and strong types of cross-heads, and this end can be best attained by the use of cast steel. In this connection let me say that the simpler the design the more satisfactory the result; complicated shapes and sections, while pretty on paper, are not generally desired by the mechanical and operating departments. I have seen a large number of designs of cross heads go through the foundry, and in every case the survival of the fittest was the survival of the simplest.

The subject of cast-steel driving boxes should scarcely require comment. The part that first receives and transmits the shock of service should be above suspicion, and the use of cast steel for this purpose would be a long step in the right direction. In a prominent locomotive shop the other day I saw piles of boxes of both steel and iron, and the large proportion of steel boxes shows that experience has proven the utility of steel for this purpose

Cast-steel frames, I think, would be an innovation on American locomotives; and yet one has but to see the large force of men, first-class blacksmiths, laboriously welding up wrought-iron frames; and the heavy tools used in machining off the comparatively large amount of excess metal, left on by the inexact method of building up, to realize the advantages of a casting, close to pattern, requiring but little to be taken out of the box squares, etc., and having a homogeneous structure throughout, instead of the doubtful welding of large iron parts. Not much has been done in America in the matter of cast frames, but abroad Krupp is turning them out constantly, and they give great satisfaction for the very reasons which I have enumerated. I would like to see American constructors take up this matter, and I feel confident that the steel-casting manufacturers would produce cast-steel frames of soft, well-annealed steel, which would meet with the entire approval of all the parties interested. In addition, dome tops, rocker arms, eccentric straps and pistons have been made in our foundry with excellent results, and the growth of the demand for these parts justifies me in saying that it is only a question of time when a much more extended use of steel castings will be made in locomotive construction.

I would call your attention to some tests of cast steel for railroad work, made at the Midvale Steel Company's Works during the past year, and representing wheel centers and cross-heads, dome tops, pistons, eccentric straps, etc. Two groups of tests are shown, the softer than that which is generally furnished, and the harder, a class which was specially requested.

Group I. shows extremes as follows:

	T. S.	E. L.	Ex.	Contr.
	61,500	29,500	32.8	54.1
	69,500	34,500	22.9	30.9
Average of 32 specimens....	66,239	33,415	30.8	49.8
Group II.				
	70,000	36,000	31.6	48.2
	79,430	38 190	23.8	30.1
Average of 25 specimens....	73,266	36,900	27.8	41.3

These tests will give you an idea of the characteristics of the metal used for steel castings, and a comparison with iron will show the enormous advantage possessed by steel; iron for wheel centers, where low shrinkage is desired, averaging but 23,000 lbs. per square inch.

To further compare cast iron with cast steel, some transverse tests of steel bars were made. Bars were prepared, 1 × 1 × 14 in., placed on supports 12 in. apart, and a load applied to the center of bar, copying in all respects the English specifications for transverse tests of cast iron. Applying a load of 2,680 lbs. and measuring, the deflection was found to be .033 in. as against .065 in. for cast iron. Continuing the application of load to 3,200 lbs., the transverse strength of good cast iron, a deflection in the steel bar of .050 in. was observed. On releasing the load the bar resumed its original dimension, no permanent set whatever being observed—this, remember, with a load that is the average breaking strength of the best grades of cast iron. After this, load was applied as before, but not measured, until the bar was bent cold through 180 deg., without showing any sign of failure. This test can be duplicated at any time, the cold bend being the favorite test of the construction department of the navy.

Now, when an iron casting breaks, it goes all at once, without any deformation of section This is due to its granular structure and its lack of elasticity; and no amount of care in making the casting can provide against it. Designs for cast-iron parts must necessarily take this into account. When, however, an undue strain is put upon a steel casting, its great elasticity, exceeding, as I have stated, the ultimate strength of the best grades of cast iron, permits it to return to its normal condition. If the strain be too great and the elastic limit be exceeded, the cast-steel part would deform, and that would be noticed at once and corrected This is especially true of castings carefully annealed, an operation constantly practiced at the Midvale Steel Works on all castings for railroad work, and necessarily practised on all castings for the government, the specifications requiring all castings and forgings to be annealed.

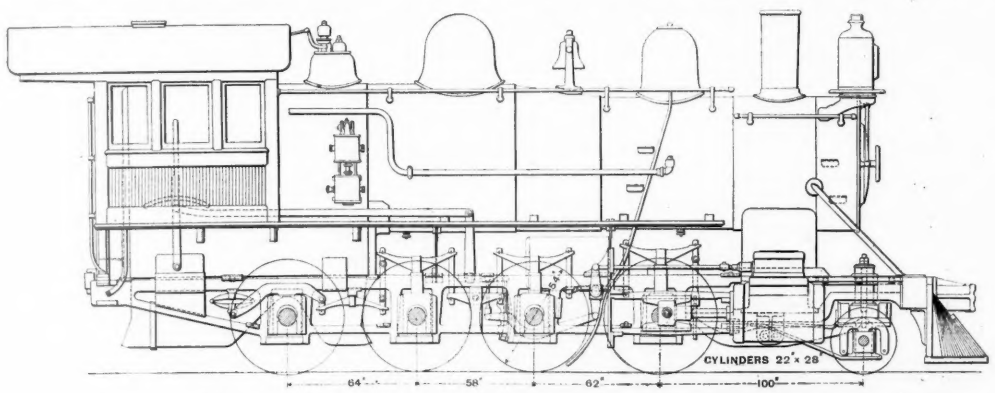
Permit me to add that the firms capable of producing satisfactory steel castings for railroad work are distributed widely enough to meet the requirements of New England consumers with promptness. The Benj. Atha & Illingworth Co., of Newark, N. J.; The Penn Steel Casting Co., at Chester, Pa., whose work is so well spoken of by Captain D. A. Lyle, the well-known Ordnance Engineer, and the numerous foundries of the American Steel Casting Company at Thurlow, and many other establishments of established reputation who are daily turning out work of superior character at prices much lower than those current in Europe. . . .

Discussion.

Mr Henry Bartlett asked if anybody could tell why cast steel and cast iron would not run well in contact with each other. To this both Mr. Sague and Mr. Barba replied that they do not know, and apparently no one knows.

Mr. Purves, Superintendent of Rolling Stock of the Boston & Albany, said that his road had found very practical changes in the use of steel driving-wheel centers. In the last locomotives received by them from the Schenectady Works the cast-steel centers made a reduction of about 600 lbs. per wheel in weight. This permitted an increase in the diameter of the boilers from 60 in. to 62 in., giving 30 additional tubes. The Boston & Albany has been using steel driving boxes since 1882. The hub is lined with babbitt metal. He does not recall ever having had a broken steel driving box.

Mr. James Smith, of the Boston Forge Co., after 49 years' experience in working iron, would hesitate long before trying steel for locomotive frames, this principally for the reason that you cannot tell certainly



Baltimore & Ohio Consolidation Locomotive, with Bell's Spark Arrester.

whether or not you get a sound casting, and the first intimation of unsoundness would be the breaking of the frame.

Mr. Butler, President of the club, put in some steel driving boxes in 1889. He found that he could force in his linings with 25 tons pressure and they would stay and did not spread the box materially. He did not cut away the steel for the lining, simply drilled in with a flat-nose drill and hammered it down and pressed it up to leave about $\frac{1}{8}$ in. of steel. He never had any trouble and never any cutting.

Mr. Frenzel has lately had a number of steel castings made for a machine with disks and arms, making 1,800 revolutions a minute, for crushing stone to an impalpable powder. As a result of his experience he chose steel castings for this high speed machine. If the castings were out of shape at all they can be straightened without any trouble. By using these in place of steel forgings or iron forgings he has cut down the cost of construction nearly 60 per cent. and cut down the weight over 35 per cent. He tests these steel castings with a very light hammer, testing by sound for flaws. In one piece, 8 in. × 4 in., he detected a flaw. He thinks that any experienced man with a delicate sense of hearing could make a very efficient hammer test.

A Consolidation Locomotive with Bell's Spark Arrester.

In our issue of Nov. 6, page 770, appeared an illustration and description of a consolidation engine (No. 1612) built by the Pittsburgh Locomotive Works for the Baltimore & Ohio Railroad, that being one of twenty lately built. The illustrations herewith show a locomotive of the same lot, No. 1629, fitted with Mr. J Snowden Bell's spark arrester, which has been adapted to the construction of front end and exhaust pipe employed in all of the 20 engines.

The special features of this spark arrester are, the double, perforated deflecting plate and the disposition of the netting in a series of inclines, using no horizontal surface except a narrow one on each side of the exhaust pipe. It will be observed that the sheet of the netting nearest the flue head is placed entirely in advance of the steam pipes, so that the ordinary objectionable joints around these pipes are avoided. The inclined sheets of netting more effectually resist the passage of large cinders than horizontal sheets would do, and an ample area of separating surface is provided. It has also been found by experience with a number of engines having this spark arrester, on the Wisconsin Central lines and Chicago & Calumet Terminal, that the life of the netting is very much longer than in the ordinary extension front arrangement.

A lift or petticoat pipe is used in this engine, and it is proposed in later applications to lower the nozzle and shorten the front, and also to use a downward extension of the stack, on the same principle as that of the Webb engine at the Chicago Exposition, which has been found to give excellent results in practice. The arrangement of deflectors and netting employed is particularly designed for use with a short front, not exceeding 30 in. from center of exhaust to smokebox front, and the greater length of front used here is in conformity with the original design of engine.

The dimensions of these engines were published in detail in our issue of Nov. 6. We repeat a few of them for the convenience of the reader:

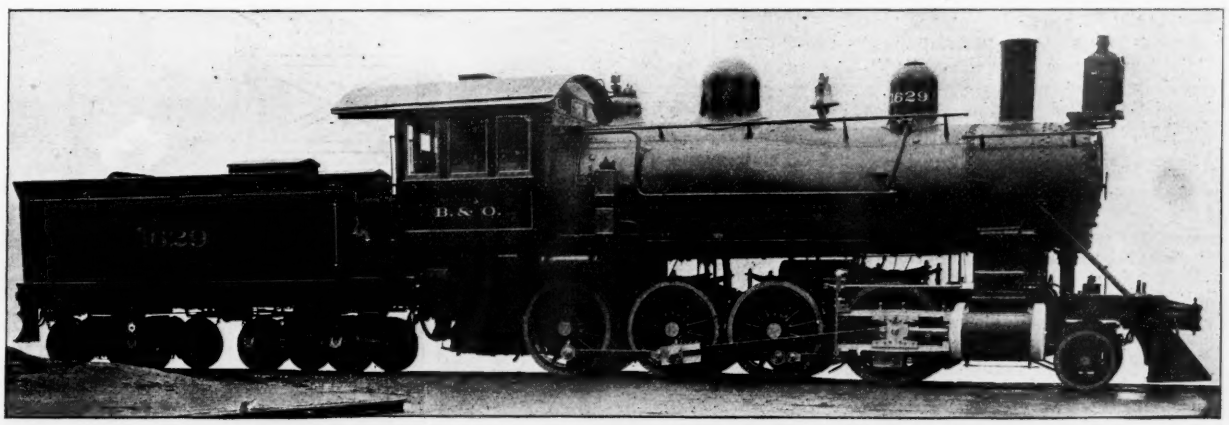
Weight on drivers	155,000 lbs.
" " truck wheels	13,000 lbs.
Weight, total	168,000 lbs.
Diameter of drivers	54 in.
Cylinders	22 in. dia. × 28-in. stroke
Boiler, diameter	64 in.
Heating surface:	
Tubes	2,132 sq. ft.
Firebox	181 sq ft.
Total	2,313 sq. ft.
Grate area	32.7 sq. ft.
Steam pressure	180 lbs.

We are permitted to add the following official account of a trial of two of these engines: On Dec. 3, 1896, trial of the two 22 in. × 28-in. Pittsburgh consolidation engines Nos. 1628 and 1624 was made on the Cranberry grade. Engine 1628 at the head of the train was run by Engineman P. J. Moran, with engine 1624, Engineman S. H. Dunning, as helper. Engine 1628 was run through from Cumberland to Rowlesburg, where fire was cleaned at front end, and the old sand removed from the sand box and box filled with sharp river sand; engine 1624 also had her box filled with this sand.

The train consisted of six double-hopper gondola cars, class N-6; seven double-hopper gondolas, class N 5; ten hopper gondolas, class N 4; one P. & R. hopper gondola car, and an eight-wheel caboose car, in all, 24 cars and a caboose. The gross weight of the train, exclusive of caboose, was 2,046,699 lbs., or 1,023 tons; with caboose, 11 tons additional, or 1,034 tons; gross weight of train, including engines and caboose, 1,202 tons. The rise of the grade is 116 ft. per mile, with numerous curves. In the construction of the road, no diminution of the grade was made at the curves to compensate for the additional resistance, and consequently it is much more severe than the figures, 116 ft. to the mile, would indicate. The usual running time of a train over this grade is between two and three hours.

Messrs. H. Middleton, General Superintendent of Motive Power, and Vernon Bell, Supervising Engineman, rode on the forward engine taking observations; on the rear engine were Superintendent of Motive Power Kalbaugh, Assistant Trainmaster Cowan and Chief Draftsman Cromwell. The day was clear and cold.

The train started from the coal chute at Rowlesburg at 1:29 p. m., and arrived at Terra Alta at 3:05 p. m., a distance of 12.3 miles, in 1 h. 36 min. Of this, 13 min. was consumed at No. 42 water station, leaving a net running time of 1 h. 23 min. The steam pressure on the forward engine was 180 lbs., the pop blowing off all the way up the hill; the helping engine had a pressure of from 170 to 180 lbs., most of the time from 175 to 180. Engine 1628 slipped her wheels only about six revolutions during the trip up the hill; engine 1624 not at all, nor was it necessary to relieve the cylinders by opening the cylinder cocks in starting the train. The start was good and strong, without any slipping of the wheels such as is usually experienced in starting a train on this grade. The injectors were feeding the boilers all the way up the hill on both engines.



Baltimore & Ohio Consolidation Locomotive, Fitted with Bell's Spark Arrester.

Built by the PITTSBURGH LOCOMOTIVE WORKS, *Pittsburgh, Pa.*

Engine No. 1628 took the train from Terra Alta east, leaving Terra Alta at 3:21 p. m., and arriving at Altamont at 4:23 p. m., a distance of 18.8 miles in 1 h. 2 min. It left Altamont at 4:32 p. m. and arrived at Piedmont at 5:30 p. m., making the distance from Terra Alta to Piedmont, 35.6 miles, in 2 h. 9 min. The total distance from Rowlesburg to Piedmont, 47.9 miles, was made in 3 h. 32 min.

How to Bring the M. C. B. Standards into Use.

At the November meeting of the Central Railway Club the regular order of business was a report from the Committee on "What is the best plan to bring about the adoption of M. C. B. Standards by Railroads?"; Committee: A. M. Waitt, G. W. West, R. S. Miller, James Macbeth, William McWood and John S. Lentz. A personal letter from Mr. Waitt says: "I have heard from each member of the committee and have outlined a report. After reading all of the letters, I decided that it was inexpedient to attempt to combine the different ideas in one report, and so thought the best results could be obtained by reading each of the letters as they have been sent in."

Mr. Waitt's official letter on the subject was in part as follows: "In establishing M. C. B. standards, I maintain that the head of the car department can, with the few that we have, personally examine and check in detail (or have the checking done in his presence and under his personal supervision), all standard patterns and gages used on his system. I believe that it is only by this exceptional direct supervision that the M. C. B. standards can be maintained in correct form. There are carried in stock at the present time by the L. S. & M. S. R'y some four or five different patterns of so-called M. C. B. journal bearings and wedges. The manager of a large manufactory of journal bearings informed me some considerable time since that he carried among his patterns over 20 different sizes and shapes of M. C. B. bearings. With such a condition existing, is it not full time to agitate the subject of standards as it has never been agitated before?". . .

"There is no loss, but rather a great gain to adopt the standard at once on all new equipment and on all repairs and renewals as rapidly as they are required. Such action is a step toward bringing about a condition of things that will materially reduce the number of repair parts that need be kept constantly in stock, and is a step toward simplifying the work of inspectors and repairers.

"In this connection, let me say that I believe no haste should be made in adopting new standards. They should be carefully studied out and experimented with by competent committees, and then where they consist of a peculiar style or dimensions of car construction, they should be first adopted as recommended practice for one year, and referred to the permanent committee on standards.

"How can we compel a road to use well-approved M. C. B. standards? Let us change the question slightly and put it in a more pleasing, but just as effective, form. How can we make it to the financial interests of railway companies to adopt for their own use on cars the M. C. B. standards? It is conceded that the M. C. B. standard dimensions and forms for construction are well suited for the purposes for which they are intended. It is true that they are of sufficient strength, and surely they are all of neat design, so that cars using them are not rendered unsightly or weak thereby. Such being the case, if these standards are used in repairs on cars of capacities corresponding with that for which they were designed, no danger can ensue from weakness, so long as they are applied so as to fit, and in a safe and permanent manner, and when once so applied they can be always readily renewed or repaired by M. C. B. standard parts by any railroad company without delay, as all companies carry in stock, or can easily do so, all the M. C. B. standards.

"In the Rules of Interchange we have striven to compel the introduction of the M. C. B. coupler, or, in other words, to make it to the financial interests of the car owners to use such couplers in place of link and pin couplers. This has been done by favoring the M. C. B. standard type of coupler, by requiring that replacements and repairs of such standard couplers shall be made by still using the M. C. B. standard, while a company having any style of link and pin drawbar cannot require its maintenance or its replacement with the same style or size. Any drawbar of sufficient strength and size can be used, and must be accepted without the owning company having any claim for wrong repairs.

"A wise change in the M. C. B. rules relating to the use of M. C. B. standards at the last convention has now given permission to use any M. C. B. standard which is of sufficient strength in place of original part. As the rules now stand no claim can be made for wrong repairs when M. C. B. standards are used in place of styles differing in shape and dimensions, so long as the strength is sufficient . . .

"Before closing this outline of my ideas on the subject, I wish to suggest the advisability of making advance steps in the work of standardizing our car construction. There can be no good reason for not designing, and after a year's trial, adopting a standard center plate, standard brake wheel and brake staff top end, standard dimensions for stake pockets, and many other frequently repaired parts, and, most important of all, standard sectional dimensions of side, center and intermediate sills and end sills for cars of 60,000 lbs. capacity, and the same for cars of under 60,000 lbs. capacity."

Mr. Macbeth wrote: "There are many ways to look at this matter, from the fact that it is well known to the mechanical department what a saving it would be if all railroads had tried to maintain standards: it would necessitate the carrying of not more than one half the amount of material at railroad shops, which is at present a very expensive matter for all roads because of the large amount of extra material required to be kept in stock on account of so many different standards being used by different railroad companies. Not only the saving on material, but the advantages to be gained in delay to freight account of railroads not having the material to repair different constructions of cars. The only way that I can see that we could get this matter in shape would be to get facts enough together to show the advantages that would be gained by all roads conforming to a standard as near as practicable. This, in my opinion, would be the only way that we could get a starting point in this matter."

Mr. George W. West wrote: "The practice of this company is the following: To use M. C. B. standard on all new equipment, and any old equipment that is rebuilt or extensively repaired.

"It seems to me, in a very short time, if the heads of mechanical departments were so disposed, the entire equipment that was interchanged would be fitted with M. C. B. standards.

"My experience has been that the men promoted to the highest offices in the gift of the M. C. B. Association, are often the last ones to adopt what they advocate in conventions, and I would be in favor of keeping such men in the background if possible, and advancing men who are working for the interests of the railroads of the country, and not their personal interests."

Mr. Lentz wrote: "First. Every member of the Association should make himself thoroughly familiar with the standards of the Association.

"Second. He should then go over the equipment on the road which he represents, and ascertain which parts can be substituted with M. C. B. standards.

"Third. For new equipment, he should make his plans and specifications to embody the standards of the Association.

"Fourth. After having carried out suggestions first, second and third, I believe he is then master of the situation, and all that is further necessary will be for him to present the subject to his superior officer for endorsement."

Mr. Miller wrote: "The adoption of M. C. B. standard parts is essential to the economical maintenance of equipment, and those that have been adopted have undoubtedly proved that the adoption of same would be advan-

tageous to all railroad companies handling foreign cars. For example: We now carry about 30 different patterns of journal bearings, some of which are required quite frequently, while others are seldom used, but all must be in stock, and not only in one place, but in 30 or 40 places on the line, and each caboose must have a supply. This is one item running up into the thousands of dollars that is practically lying idle.

"The present M. C. B. rules of interchange provide that cars may be repaired with M. C. B. standard parts, when they do not impair the strength of the car. This rule should be adhered to by all railroad companies by repairing all freight cars with M. C. B. standards when possible to do so, and charging the owner for same. Also by refusing to furnish defect card for wrong repairs when M. C. B. standards are used. All inspectors should be instructed as to what has been adopted as standards, and to pass cars, if safe to go, when wholly or partially equipped with M. C. B. standards, regardless of appearance, looking only to safety."

Mr. McWood wrote: "It becomes our bounden duty to our employers, as well as to ourselves, to consider well before adopting any standard, and 'be sure we are right and then go ahead.' I am furthermore of the opinion that the trials and tests made under the direction of the M. C. B. Association are of the best nature possible as a whole, and would endeavor to convey the idea that by taking advantage of the results of these tests we are the gainers. There is scarcely anything which will produce as quick results, as convincing a person that he is the loser by not doing certain things, and this will apply to the M. C. B. standards. . . . We have had fairly good results from the agreement reached some time ago, by which it was legitimate to use M. C. B. standards in making repairs to foreign cars, even though such standards were not used in the original construction, and I am inclined to the opinion that acting along this line will produce the more satisfactory result than to adopt a more stringent rule, especially at a time when trade is somewhat demoralized and receipts below the average."

The Philadelphia & Reading Railroad Subway and Tunnel in Philadelphia.

BY WALTER ATLEE, C. E.

Sewers.

From time to time during the year, the *Railroad Gazette* has given descriptions of the work being done in the open subway and tunnel for the Philadelphia & Reading Railroad in Pennsylvania avenue, in Philadelphia. A description is now given of the reconstruction of the sewer system of the adjoining portion of the city necessitated by the change of grade.

Three independent systems of main sewers are necessary for the drainage of this territory under its new conditions in the most economical manner. On account of the low grade of the subway entirely new sewers were required. These sewers being in the heart of a great city, almost entirely built up, and as their duty was from 25 to 45 ft. below the grade of the existing streets, it was decided that, wherever practicable, they should be built in tunnel, so that interference with street travel should be reduced to a minimum.

Sixty-three and one-half per cent. of the whole work was accordingly carried on in tunnel, to which access was had by 52 shafts. The excavated material was raised by compressed air hoisting engines with derricks, compressed air being used so as to cause as little inconvenience as possible to the residents. From these shafts, tunnel headings were driven: when in rock they were almost invariably worked with Ingersoll-Sergeant or Rand drills driven by compressed air. In soft and rotten rock, hand drills were most frequently used. Forcite powder containing from 30 to 50 per. cent. of nitroglycerine was the explosive used.

Water and gas mains, electrical conduits and old sewers, many of which did not appear upon the records of the different Bureaus, greatly hindered the construction of the new sewers. By the caving in of the inverts of old sewers directly above the new, considerable delay was incurred.

The building of outlets into the Schuylkill River at Powelton avenue was exceedingly tedious, owing to the fact that the sewer had to be built on piles, and a platform with its top below mean low water, requiring the use of a diver and making it necessary to work for a time at low tide only.

On Pennsylvania avenue, between Green street and Fairmount avenue, the tunnel excavation was carried on beneath dwellings, many of which were occupied. All open spaces between the brickwork of the sewer and side of the tunnel were filled with rubble masonry.

The first system, known as the Twenty-fourth street and Pennsylvania avenue system, provides for the drainage west of Twenty-fourth street on the north side of Pennsylvania avenue, intercepting all the cross-streets between Twenty-fourth and Thirtieth streets, carrying the same under the subway, down Twenty fourth street to Powelton avenue and on the line of this avenue to the Schuylkill River.

These sewers cost $219,082.57, and consisted of 1,337 ft. of 10 ft. 6 in. diameter circular sewer, 1,506 ft. of 9 ft. 6 in. diameter circular sewer, 870 ft. of 8 ft. 6 in. diameter circular sewer, 293 ft. of 8 ft. diameter twin circular sewers, 205 ft. of 8 ft. diameter U-shape sewer, 1,217 ft. of 7 ft. 6 in. diameter circular sewer, and 39 ft. of separating sewer for the twin sewers. Of this total length of 5,459 ft. of main sewer 3,879 ft. were built on tunnel. On account of the new sewer on Twenty-fourth street being located beneath the old one, and eventually intersecting it, this portion was built under special difficulty; a wooden flume 6 ft. × 6 ft. was built beneath the west sidewalk from Hamilton street to a point on the old U-shaped sewer near the river, several breaks in the bottom caused the sewage to fall in the excavation underneath.

A tunnel was driven beneath Callowhill street and from Hamilton street north, and access to the workings was had through nine shafts, some of them on the side of the line, from which drifts were driven to the main tunnel. The tunnel was mostly in rock, though under Pennsylvania avenue it was in gravel. Ingersoll-Sergeant drills with 3½-in. cylinders were used, the compressed air being supplied by an Ingersoll-Sergeant Class "A" condenser, with a capacity of 12 drills. The compressors were supplied with steam from two horizontal boilers of 80 H. P. each; 10 hoisting engines and 12 pumps were employed on this portion.

On the line of Pennsylvania avenue from Twenty-first street to Twenty-ninth street, about 2,912 ft., the sewer was built in tunnel, the majority of which was through rock. Sixteen shafts were sunk on this section. The only difficulty encountered was while running through the bed of an old stream west of Twenty-eighth street. From Green street to Fairmount evenue the new sewer passes at a depth of about 40 ft. underneath the plant and buildings of a large ice-manufacturing company. Drills of the Rand type with 3⅛-in. cylinders, and two Rand compressors with joint capacity of 13 drills were used. The compressors were supplied with steam from two horizontal boilers of 75 H. P. each. Seven hoisting engines and six pumps were also in service.

The second, or Callowhill street system of sewers provides for the drainage of the subway and tunnel from Thirteenth to Twenty-third streets by means of a main sewer on Callowhill street with appurtenant sewers on the cross-streets leading under the subway and receiving the sewage through well-holes from the old sewers on the north. From Twenty-third street the main sewer follows Powelton avenue to Twenty-fourth street, passes along Twenty-fourth street to Wood street and thence into the Schuylkill River. The cost of this system will amount to about $153,000.

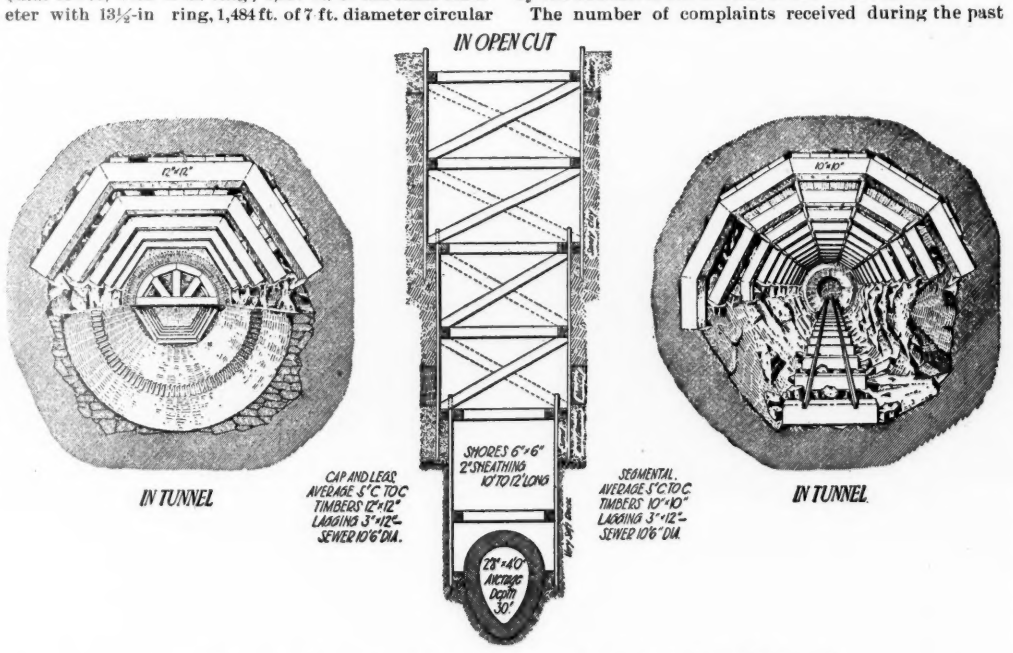
The system consists of 140 ft. of 8 ft 6-in diameter circular sewer, with 18-in. ring; 1,244 ft. of the same diameter with 13½-in ring, 1,484 ft. of 7 ft. diameter circular sewer, 478 ft. of 6 ft. 6-in. diameter circular sewer, 846 ft. of 5 ft. 9-in. diameter circular sewer, 693 ft. of 4 ft. 9-in. diameter circular sewer, 438 ft. of 4 ft. 6-in. diameter circular sewer, 274 ft. of 4 ft. 3 in. diameter circular sewer, 1,057 ft of 4 ft. 6-in by 2 ft. 8-in. egg-shape, with 12 in. T. C. pipe. 504 ft. of 4 ft. diameter circular sewer, 265 ft. of 3 ft. 3-in. by 2 ft. 2-in. egg-shape sewer, 508 ft. of 3-ft. diameter circular sewer, 265 ft. of 2 ft. 9-in. diameter circular sewer, 265 ft. of 2 ft. 6-in. by 1 ft. 8-in. egg-shape, with T. C. pipe, 38 ft. of 2 ft. 6-in. diameter circular sewer and 14 ft. of junction chamber. There are 593 ft. of 4-ft. by 2 ft. 8-in. egg-shape sewer that cannot be built until after the subway shall have been constructed. It was also thought inadvisable to finish the sewers on Thirteenth street as well as a pipe-sewer on Callowhill street, between Twelfth and Thirteenth streets at present.

Of this total length of 9,555 ft. of main sewer, 7,806 ft. were built in tunnel, access having been had to the workings through 29 shafts. From the Schuylkill River to the intersection of Twenty-third and Callowhill streets the sewer was built in open cut and it was necessary to under-pin the buildings at the Southeast corner of Twenty-fourth street and Powelton avenue, on account of inadequate foundations of the building. The sewer was built in tunnel under Callowhill and Twenty third streets, and here difficulty was caused by an old sewer, of which there was no record, and very soft material to tunnel through. At Twenty-second street, the tunnel work again commenced and the rest of the sewer, including the whole of Twenty-second street extension, was in tunnel. The workings under Callowhill street and Twenty-second street were reached by eight side shafts with drifts to the main tunnel.

Considerable difficulty was experienced by the breaking of an old sewer at Nineteenth and Callowhill streets. Most of the excavation was in rock, although there were places where it was so soft as to require full timbering and lagging. Drills of the Ingersoll-Sergeant, Rand and Kernan types were used by one contractor; they were fed with compressed air through a 4-in. service pipe from a Blake duplex compressor with a capacity of eight drills. This compressor was supplied with steam from two vertical boilers aggregating 70 H. H. Another contractor used drills of the Ingersoll-Sergeant type with 3⅛-in. cylinders fed with compressed air through 3-in., 4-in. and 5-in. service pipes from a Norwalk single compressor with a capacity of 12 drills. The compressor was supplied with steam from two vertical boilers of 65 H. P. each. There were also 13 hoisting engines, 18 steam pumps and two ventilating fans in service.

The third, or Twelfth street system of sewers is designed to intercept the old Thirteenth street main sewer at Buttonwood street, thence down Buttonwood street to switch to Carlton street, where it discharges into an old main sewer on the Delaware River watershed. This work consisted in building 1,398 ft. of 6-ft. diameter circular sewer, entirely by open cut, and cost $22,823.49. This makes the total cost of the three systems of sewers about $426,350. The work was begun in 1894 and practically completed in 1895. There were six contractors working day and night, and each contractor working at a number of places at the same time.

PHILADELPHIA, PA., July 1, 1896.


IN OPEN CUT
IN TUNNEL
CAP AND LEGS AVERAGE 5'C TO C TIMBERS 12"×12" LAGGING 3"×12" SEWER 10'6" DIA.
SHORES 6"×6" 2" SHEATHING 10' TO 12' LONG
28"×40" AVERAGE DEPTH 30"
SEGMENTAL AVERAGE 5'C TO C. TIMBERS 10"×10" LAGGING 3"×12" SEWER 10'6" DIA.
IN TUNNEL

Timbering Used in Sewers—Philadelphia & Reading Subway Work, Philadelphia

Georgia Railroad Commissioners' Report.

The Railroad Commissioners of Georgia, L. N. Trammell, Allen Fort and Thomas C. Crenshaw, Jr., have issued the twenty-fourth annual report of the commission, which is for the year ending Oct. 15, 1896. The length of railroad in Georgia is 5,291 miles, an increase of 51 miles over the preceding year. The report gives a double-page table of earnings and expenses, showing the figures for each of the 55 railroads operating in the state. Many of these roads are operated or controlled by the Southern, the Central or the Plant system.

The number of complaints received during the past year has been large. Some complaints have concerned interstate commerce, but in many instances the Commissioners have succeeded in adjusting these informally, saving the trouble and expense of an appeal to Washington. As the business of canning fruit has largely increased since the freight rates on canned goods were established by the state, the Commissioners have ordered a reduction from fourth class to fifth class on small lots, and from fourth class to sixth on carloads. The new rates, they say, are just to the railroads and satisfactory to the manufacturers.

The demurrage rules established by the board, acting under the law autharizing rates for storage, have met with some opposition, and it is recommended that the statute be changed so as to expressly include demurrage charges.

Under the law of 1894 the commission has acted as arbitrator in five railroad assessment cases. The Legislature is asked to provide for the expenses of such arbitration.

The commission has amended its rule No. 1, requiring two or more roads under the same management to make through freight rates on the same basis as though the line belonged to a single company. The rule now covers cases where the ownership is in the same interest, but the fact is concealed or denied; but the report does not state whether the Southern Railway, whose action, we believe, led to this amendment, has complied with the new rule.

The Interstate Commerce Commission has not yet given an opinion on the application of the Georgia Commission for a reduction on peaches to Northern points, though the case was argued nine months ago. The Eatonton Branch, ordered by the commission to lay new rails, has complied and the commission will dismiss the suit against the road. A suit has been instituted against the Wrightsville & Tennille for refusing to give a through bill of lading over the Augusta Southern.

The report has a chapter in favor of uniform freight classification, and also one urging the importance of

uniformity in state and interstate statistics. Suitable blanks have been sent to the roads, and the Commissioners "will continue to urge the duty and necessity" of furnishing the information asked for.

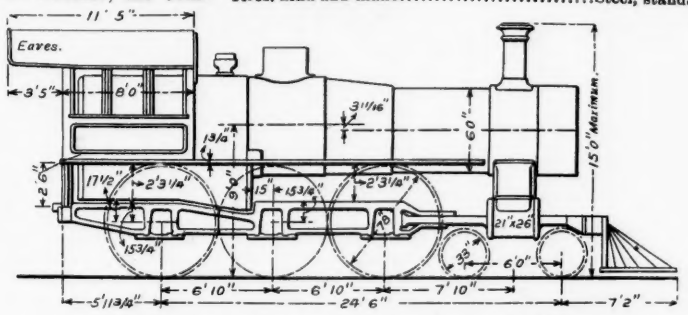
The Southern Railway, with its allied lines, controls 2,135 miles of road in Georgia, and as "the concentration of vast power is a menace to the liberties of the people," the Commissioners mention this fact; but they do not make any specific recommendation. Speaking of the Seaboard Air Line rate war of last summer, the Commissioners trust that the Interstate Commerce Commission will be given ample and complete power to regulate controversies that result in wars of rates.

The report recommends that where a new railroad wishes to get into a city by using the terminals of an old line it should be allowed to do so on just and reasonable terms. A former recommendation that the prompt collection of overcharges be expedited by legislation is renewed. The board also recommends a law to provide for the supervision of the issuance of railroad securities, and one to facilitate the enforcement of the rules of the commission. Suing for a penalty, as is now necessary, is very slow. The Commissioners are discouraged that the Legislature has paid so little attention to their recommendations in past years, and call attention to the fact that, after they have faithfully recommended, the responsibility lies with the law-making power.

Baldwin 10-Wheel Locomotive for the Baltimore & Ohio.

In the *Railroad Gazette* of Oct. 16 was shown one of the Cooke consolidation locomotives recently built for the Baltimore & Ohio, and in the issue of Nov. 6, another consolidation locomotive built by the Pittsburgh Locomotive Works for the same road was shown. We illustrate this week one of six 10-wheel passenger locomotives, with 78-in. drivers, which have been built for the Baltimore & Ohio by the Baldwin Locomotive Works. These locomotives are Nos. 1308 to 1313 inclusive. The following table gives the general dimensions of these locomotives:

Simple or compound	Simple
Total wheel base	24 ft. 6 in.
Rigid " "	13 ft. 8 in.
Total " " of engine and tender	51 ft. 8¼ in.
" length of engine and tender over all	61 ft. 9 in.
Diameter of cylinders	21 in.
Stroke of pistor	26 in.
Diameter of piston rods	3½ in.
Size of steam ports	19 in. × 1¾ in.
" " exhaust ports	19 in. × 2¾ in.
Greatest travel of slide valves	6 in.
Outside lap of slide valves	1 in.
Lead of slide valves in full stroke	⅛ in.
Diameter of driving wheels, outside	78 in.
Kind of truck wheels	Wrought center
Diameter of truck wheels	33 in.



Ten-Wheel Passenger Locomotive—Baltimore & Ohio.

Crown plate stayed with	One tee-iron front, bolts 1⅛ in. dia., rad. stays
Diameter of dome	31½ in.
Height of dome	From top of rail, with boxes in center of pedestal, 14 ft. 9 in.
Steam pressure	190 lbs.
Kind of grate	Rocking, Company's pattern
Grate surface, sq. ft.	34.27 sq. ft.
Heating surface of firebox, sq. ft.	215.2 sq. ft.
Heating surface of tubes, sq. ft.	1978.52 sq. ft.
Total heating surface, sq. ft.	2193.72 sq. ft.
Height from top of rail to top of smoke stackboxes in center of pedestal	15 ft.
Tires, kind and make	Steel, standard
Guides and crossheads, type and metal	Two bar type, iron guides, cast steel heads
Connecting rods	Parallel rods I section, solid ends, steel
Brakes	Westinghouse American outside equalized
Lubricators	Nathan sight feed
Injectors	No. 10, Metropolitan
Valves	Three, Coale muffled 2½ in.
Gages	Two Crosby Thermostatic
Springs	E. L. W.
Headlights	18 in. sq.
Special devices	Air signals; Leach sander; Gold steam heating device; Gould coupler
Tender—Wheels, diameter	36 in.
" Axles	Steel
" Size of axle journals	4½ in. × 8 in.
" Water capacity of tank	3,500 gal.
" Frames	Wood
" Brake beams	National Hollow, 2½ in.
" Brake heads and shoes	Malleable head, cast iron shoe

American Cars in England.

The South Eastern Railway Company have resolved to be the pioneers in introducing to this country railway cars constructed on the American open-vestibule principle for first, second and third-class passengers. The first of these trains, which is to begin running to-day, is unquestionably in the whole of its details and appointments a singularly fine specimen of English workmanship, as it is also the handsomest train yet offered to all classes of travelers on an English railway. It is to be attached to the company's service between London, Hastings and St. Leonards, and is shortly to be followed by a similar train, which has been ordered from the works of the Metropolitan Carriage Company at Saltley, near Birmingham, for use in connection with the South Eastern Company's continental services via Folkestone and Dover. If it be found that the new cars are appreciated by the public, more of like character will be provided for the routes to seaside and other places.

The Hastings and St. Leonards train, which has cost about £12,000, is slated to accommodate 193 passengers, there being two first-class cars for 51 passengers, one second-class for 27 passengers, and three third-class for 115 passengers, together with two baggage vans. All the coaches are mounted on four-wheel bogies, and each car weighs 24 tons, so that, with the vans of 14 tons each and the four wheel bogie express of nearly 60 tons, the total weight of the train is not less than 230 tons. The cars are about 50 ft. long, and access from one to the other is obtained by means of flexible vestibule connections. Smoking-compartments are provided for the three classes of passengers, and each car has its own lighting, heating and lavatory arrangements. One of the first-class carriages contains a main saloon 30 ft. long, fitted with both revolving and fixed chairs while the other is divided into two smaller compartments, one of which will be reserved for the use of ladies. The second-class car is in three divisions—a ladies' compartment to seat four at one end, a smoking-compartment at the opposite end, and the main saloon in the center. The public will be struck with the superior accommodation offered in the train to third-class travelers.

The decorations throughout the train are bright and in good taste, the cars are lofty, and while being warmed in winter have ample ventilation openings. Mr. A. B. Gill's extremely simple arrangement is adopted for the electric illumination, the dynamo being suspended below the frame of the carriage and so adjusted that the varying speed of the train does not affect the current supplied to the lamps. Accumulators are fitted to continue the light when the train is at a stand-till, and the installation, having given satisfaction on 35 other railway lines, promises to be equally successful on the South Eastern system. The new train has been constructed under the superintendence of Mr. H. S. Wainwright at the company's works at Ashford, where 300 ordinary carriages are now also being built.—*London Times*, Dec 1.

Tonnage Rating.

At the November meeting of the Western Railway Club one of the subjects considered was a report of a committee on "Recent Developments in the Tonnage System of Rating Locomotive Performance."

Abstract of the Report of the Committee.

The developments in the tonnage system of rating locomotives consist principally of three parts or divisions. First: In efforts to improve the accuracy of the way bill weights and light weights marked on cars, which are used to ascertain the weights of trains as made up. Second: To make proper allowances in the ratings when trains consist wholly or in part of empty or partially loaded car. Third: To so arrange the performance sheet that proper deductions may be made from the results shown thereon. Much yet remains to be done in these three directions, and it is the intention of your committee to offer as suggestions for discussion and further investigation the following topics, which in its opinion have a direct bearing on the question.

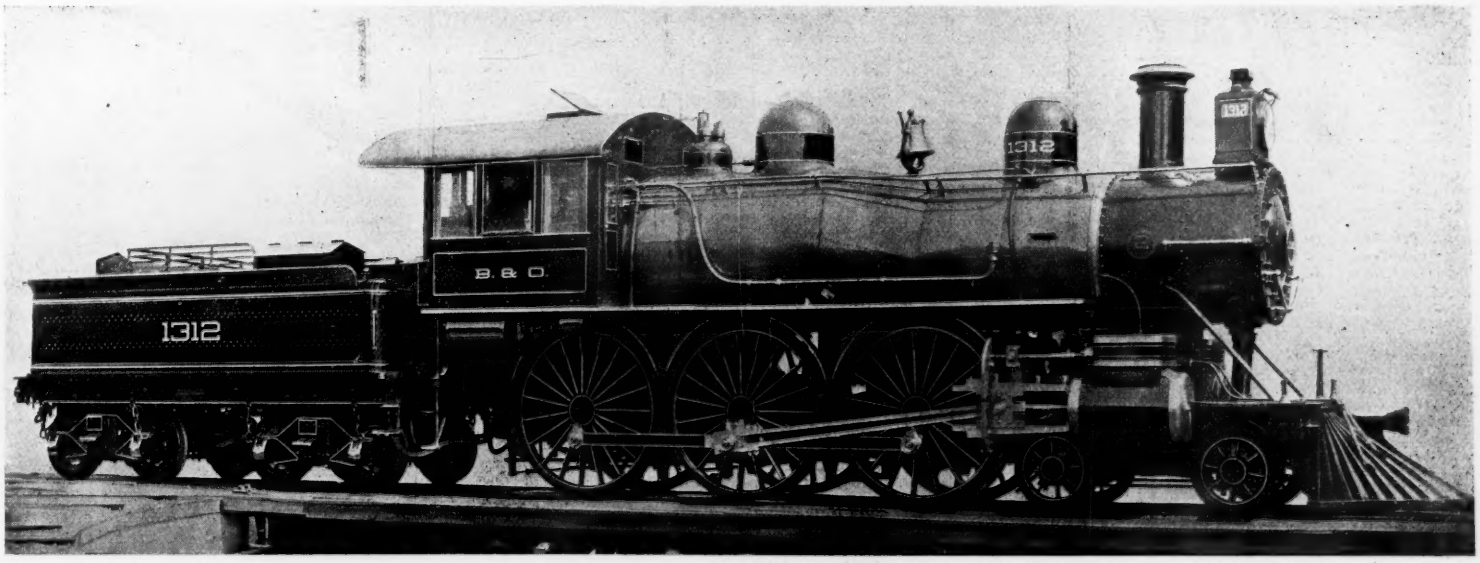
A. The actual weight of the contents of the car should always appear on the way bill. Where actual weights cannot be obtained, agents should be trained to estimate them as closely as possible.

B. Actual weights of empties containing tare of various kinds should be used. Empty stock, refrigerator or other cars often contain large amounts of refuse matter, ice and other substances which make them in fact partially loaded cars. Systematic methods of treating such cars as partially loaded should be worked out.

C. The weight of the engine and tender should be included in the weight of the train.

Under the second division the methods to be employed to improve existing conditions must be more experimental than administrative. We may improve the accuracy of our loading and estimating the weights of trains by proper instructions and administrative methods, but we cannot tell the relative effect upon the performance of the engine of a given tonnage in heavily loaded cars, and the same tonnage in empty cars without actual tests. Tests should be made of trains of loaded, partially loaded and empty cars of known tonnage on different gradients and with different conditions of curvature; such tests to cover even ordinary conditions must be made with a dynamometer. They must be numerous and very exhaustive, and when finished they may show so many variable factors necessary as to make their practical value small. Every train that is run can be made a means of giving valuable information on the proper rating of empty and partially loaded cars, provided a careful record of its make up and the resulting performance is kept and compared with other trains of different make-up hauled by the same engine and crew. Close attention must be given to weather conditions, especially the wind, in making comparisons. (See Northwest Railway Club proceedings, December, 1895, and February, 1896, and Western Railway Club, April and May, 1896.)

Under the third division the economic results to be obtained by the stimulus upon the enginemen of a well-arranged locomotive performance sheet are unquestion-



Ten-Wheel Passenger Locomotive for the Baltimore & Ohio Railroad.

Mr. HARVEY MIDDLETON, *General Superintendent Motive Power.* *Built by the* BALDWIN LOCOMOTIVE WORKS, *Philadelphia, Pa.*

Size of driving axle journals	8 in. × 10 in.
" " truck " "	5 in. × 10 in.
" " main crank-pin journals	6 in. × 6 in.
Description of boiler	Wagon top
Diameter of boiler at smallest ring	66 in.
Material " "	Steel
Thickness of plates in boiler barrel	5/16 in.
" " " firebox shell	5/16 in.
" " " sides and crown of firebox	5/16 in. and 5/16 in.
" " " front and back tube sheets	½ in.
Kind of horizontal seams	Butt
Kind of circumferential seams	Double riveted
Material of tubes	Iron No. 12 w. g.
Number of tubes	231
Outside diameter of tubes	2¼ in.
Length of tubes over tube sheets	14 ft. 7⅛ in.
Inside length of firebox	120⅝ in.
Inside width of firebox	41 in.
Depth of firebox from crown sheet to bottom of mud ring	F. 73½ in. B. 61 in.
Water spaces, sides and back	3 in.
Water spaces, front	4 in.

should enable the most efficient design to be selected for each division.

E. M. Herr,
Wm. Forsyth,
S. P. Bush,
Committee.

Discussion.

Mr. Tracy Lyons (C. Gt. W. Ry.): In making up trains from way bills it is assumed that the actual weights of the contents of the cars are shown thereon, but our experience is, as the committee states, that the agents tend to overestimate such weights when the actual weights are not to be had. Much of this overestimating is done on grain shipment at small stations and is due to negligence on the part of the agents, rather than inability to obtain proper weights. Our agents are all provided with tables showing the weight of the contents of cars of various lengths loaded with different grains according to the height of the load, and it is very rarely the case that the shipper does not know within a small margin how much has been loaded in each car. As far as merchandise and other lading is concerned, the agents can obtain the weights quite accurately if they are inclined to do so; the weights from small stations are constantly checked up by the freight auditor, as well as the superintendents, and the agents are instructed and disciplined for neglect in this respect.

Actual tare weights of stock cars especially should be shown on a ticket placed upon the car at all delivering points where such cars are weighed. Of course this would entail considerable work for weighing clerks, yard clerks and conductors and it would cause consequent expense, but I am sure that we shall get to it eventually. . . . We have made no allowance for the varying proportion of coal consumed in moving the engine and tender when hauling trains of different weights. We have considered that such an allowance would result in a complication of accounts which would not be justified, inasmuch as there are other elements entering into the problem, such as the constant variation of the wind, the making up of time, etc., which it is not practicable to allow for and yet which would make more difference in the consumption of coal than the variation referred to.

I agree with the committee that we are in great need of numerous and exhaustive tests of the effect upon the hauling capacity of the locomotives of tonnage variously distributed and made up, more or less, of empty cars. Our own figures upon the allowance in the tonnage which should be made for empty cars have been based upon the rather crude assumption that under ordinary conditions the wheel resistance of a loaded car was 6 lbs. per ton and of an empty car 8 lbs. Upon this assumption it may be said that 4 tons should be taken from the nominal capacity of a locomotive upon a level track, for each empty car. Taking the car to weigh 12 tons, an increase in the resistance of from 6 to 8 lbs. per ton would be equivalent to increasing the weight of the car to 16 tons. But as much of the traction of the engine is consumed in overcoming the grade resistance, and less is taken up by the wheel resistance, the allowance in the rating which should be made for the empty car grows less. On a 1 per cent. grade the proportion would be as 26 to 28 lbs., instead of as 6 to 8 lbs., and the proper deduction from the rating for each empty car about 1 ton instead of 4. A sliding scale of this sort can easily be made for use on different grades, but we do not consider this necessary or advisable at this time, and we therefore make a general deduction from the rating of 1 ton for each empty car in the train, considering that this is a sufficient allowance upon our ruling grades and that on lesser grades a full allowance is not usually required. We have ignored for the present all questions of partially loaded cars or the effect of different degrees of curvature, considering this a refinement beyond the present state of the system of locomotive rating as a whole. . . .

Some of the points I speak of are referred to in greater detail in my paper upon this subject which appeared in the April, 1896, proceedings of the club.

Mr. A. E. Manchester: At the present time on nearly all of our main lines the coal performance of our engines is kept on a tonnage basis. During this time we have made some tests with a dynamometer, but as stated by the committee there are so many details to look after that I do not feel warranted in saying at present that we have sufficient information from our dynamometer reports to be prepared to lay down any definite rule for loading trains from them. We receive from the conductor a report showing the mileage of each car, and the light and gross weight of the car. From this the performance is made up on two different sheets, one of which is intended especially for the locomotive department officers and the enginemen. It shows the mileage of the engine with the regular engineer's name attached, showing the number of miles made by him, also the number of miles made by the extra engineers; the ton miles, the number of pounds of coal consumed, the cost for hauling 100 tons one mile in pounds of coal and also an amount, expressed in dollars and cents, showing what the cost has been for the performance of each engine as compared with the average; the heading being the amount saved by the economical use of coal and the amount lost by excessive use of coal. The result has been decidedly favorable on the divisions in which it has been longest in use. The comparison of a division that has been worked under the tonnage system for two years shows a saving of about $1,500 per month with about 30 engines in service.

The second performance sheet referred to is intended for the use of the transportation department. It shows the average weight of the trains, the average loading in the cars and the number of empties or the percentage of empties that are handled in either direction. This also is giving good results in the loading of cars, and in decreasing the number of empties that are handled.

In making inquiries of our superintendents as to whether any benefits could be derived on certain divisions by giving them larger engines, I have in several instances been met with the reply that the engines that were then in service were performing all the work that there was to do; that they had a certain number of trains arbitrarily to run and it was seldom that the engines then in the service could not handle those trains and that larger engines would not increase the train haul. In following up the reports in some of our passenger service, this has been equally true. On a division in which the passenger service had for years been handled with 17-in. engines they were exchanged for 16-in. engines, which have performed the services satisfactorily with a saving of about 15 per cent. in fuel and repairs.

Mr. J. H. McConnell (Union Pacific): I had some tests made four years ago to determine the difference between the amount of fuel burned on a fast train and a slow train, and in making the test I obtained information that I was not looking for. I found that with a train going in a certain direction, making a certain speed with nine passenger cars, on one day in running 138 miles, the engine burned 7,050 lbs. of coal, and the wind was blowing at the rate of 10 miles an hour. On another trip with the same number of cars in the same direction, with the wind blowing 20 miles an hour, the engine consumed 11,300 lbs. of coal, showing that the effect of the wind increasing from 10 miles to 20 miles an hour, under the same conditions, caused an increase of 4,250 lbs. of coal consumed; and in eight tests made in the same direction we got the same results, when there was an increased wind resistance against the train.

Some time ago I noticed some empty stock cars that had 12 in. of bedding in the bottom of the cars, and others had 8 in. I had the cars weighed and one car had 27,000 lbs. of bedding in the car in addition to the weight of the car, and another car had 14,000 lbs. We were pulling the empty car and it had 14,000 lbs. in one case and 27,000 lbs. in the other.

We commenced about five years ago to increase our train haul and to run our trains by tonnage. We have made the greatest improvement on that portion of the road where we have the heaviest grades. On the eastern portion of the road where the grade is about 10 ft. to the mile, between Omaha and Cheyenne, we do not use the tonnage system. We haul according to the time of the train, 30 loaded cars 22 miles an hour and 44 loaded cars 15 miles an hour with an 18 × 26-in. cylinder engine, eight-wheeler, westbound, and as high as 60 loads eastbound. After leaving Cheyenne we have a grade 34 miles long, 80 ft. to the mile. On the other side the grade is 22 miles long and the maximum grade is 96 ft. per mile. We pay a great deal of attention to the eastbound tonnage, from the fact that most of our empty cars are westbound and our loaded cars eastbound. Sometime ago we were pulling 36 loads up the 96-ft. grade with a 22 × 28-in. cylinder consolidation engine and a helper. Now with the same engine and helper we are pulling 1,160 tons and it frequently takes 36 loads to make this. On the next district where we were pulling 1,000 tons, we have increased that with the same engines to 1,300 tons, giving them a helper at certain points to help over the grade, thereby increasing the tonnage 300 tons.

We do not find any difficulty in ascertaining the proper amount of tonnage to be given to an engine, from the fact that the yardmaster makes up the train and he gives the conductor the tonnage of a car and the load, and the result is that the conductor always asks "How many tons have you?" not "How many cars have you?" Where we were pulling 22 and 24 cars over some of the grades, by introducing the tonnage system we frequently pull 26 and 28 cars to make the tonnage. This has been going on with us, as I said, about five years. We have increased our train haul about 29 per cent. and we have also at the same time reduced the amount of coal burned per car mile.

In 1890 we burned a little over 8½ lbs. of coal per car mile in all service. We have reduced that to a little below 7 lbs. per car mile for all service. That includes passenger and freight and the amount used by switch engines. In our passenger service we have reduced the pounds of coal per car mile from 16½ lbs. per mile to 14. We have increased the number of loaded cars in a train, the average for the year in passenger service being from 5 cars to 6.3 cars and in our freight service from 15.86 to 20.22 cars, and I think that this year our average train haul will show nearly 21 cars to the train over the whole system. While we have increased the hauling capacity of our engines 29 per cent. we have reduced the cost of operating the locomotives 8 per cent.

Mr. Baker (C., M. & St. P.): Our idea in going to the tonnage system has been that it ought to cause a reduction in the pounds of coal required to haul 100 tons of train one mile, and that was the first and chief object. We have very satisfactory results, and I am inclined to think that the average train haul is a considerable improvement over what it was when the number of cars instead of tonnage hauled was the basis on which trains were made up.

In following up those records several other points were developed; for instance on one division a thousand tons in round numbers is the average weight of the train, including the engine and caboose: on another division 600 tons is the average train with the same engine. The statement showing the pounds of coal per hundred tons of train hauled one mile in the one case shows very badly indeed. We spend for locomotive repairs, practically, one half as much as we do for fuel, and we are figuring now on adding to this performance sheet the cost of repairs per hundred tons haul one mile in addition to the cost of fuel. I think that we will find, comparing two of our busy divisions, that the saving in the cost of repairs and in the cost of fuel per hundred tons hauled one mile will show up in such a startling manner that we will wonder why we have not spent considerable money in taking the grades out of the unfavorable divisions. In some places it can be done, and in some places it cannot, but this sheet is giving us the information which will show how much we actually lose in dollars and cents for fuel and repairs of locomotives for a given time, and I think it certainly is going to induce the company to spend considerable money in the line of taking out controlling grades.

In addition to this statement showing the average tonnage which engines have hauled during the month, gives to the general manager and general superintendent information as to the loading of trains that is proving to be of great value. The falling off in a trip, in a month, of 50 or 60 tons, or 10 per cent. of the load hauled by engines, is not infrequent, and these reports present this matter so clearly that the division superintendents at the end of the month can see quickly whether they have been loading their trains to their best capacity, and it will enable them to take steps to remedy any deficiency of that kind in the future.

Mr. C. H. Quereau (B. & M. R. R.): We have used the tonnage locomotive rating for about a year. During this time traffic conditions have been such that, in my opinion, we have not realized the full benefits of this system, yet under this unfavorable condition we have had a considerably smaller number of delays due to engine failures, a smaller number of cases of doubling, better coal records, and in the direction of heaviest business an increase of from 15 to 25 per cent. in the average train load. Owing to the light traffic, we have not revised our original ratings, but expect to do so by the first of next year.

The following may be of interest in showing the unreliability and misleading figures obtained by using the loaded car mile as the basis of fuel records, and the advantage obtained by the use of the ton mile as taken from our records:

POUNDS OF COAL PER LOADED CAR MILE.

	July—1896	August,	Loss for August.
Passenger	10.97	11.64	.67
Freight	5.55	6.17	.62

$3,368.83

POUNDS OF COAL PER 100-TON MILES.

	July—1896	August,	Gain for August.
Passenger	25.70	25.52	.18
Freight	20.51	20.32	.19

$664.06

This gives a difference of $4,032.89. It is very probable that a large part of the discrepancy due to the use of the loaded car basis is accounted for by the fact that we began using our new 36-ft. stock cars in August, which weigh, when loaded, from six to seven tons more than the old cars. On the car-mile basis both have the same value, but the ton-mile basis allows for the increase in weight.

Mr. S. P. Bush (Pa. lines): We have on our lines what is known as the coal premium system, and in order to conduct it fairly and to more closely measure the work performed by each engine and crew, we have thought that the measurement should be made on the basis of tonnage, instead of upon the basis of cars hauled, and during the past summer we made some tests to determine whether or not it would be necessary to make allowances for the variations in the number of cars hauled. In other words, it is our desire to find out whether we could use a straight tonnage basis in measuring the work done or whether it would be necessary to use an adjusted tonnage system. It should be borne in mind that there is a very wide difference between the tonnage rating of engines for train-loading purposes and the work performed in hauling a train a given distance. In the first case the tonnage rating of the engine is influenced by the grades, and in the second case the work done by the locomotive is the factor to be determined. In order to ascertain the work done under the conditions of constant tonnage and a variable number of cars, we concluded that the coal consumed would be a fair measure, having a constant schedule (thereby insuring a constant speed), the same kind of coal and the same crew; in fact everything being constant excepting the number of cars. We feel that if a sufficient number of tests were made on this basis, tolerably accurate results would be obtained.

The experiments show that with a constant tonnage of 1,100 tons and an average speed of 17 miles per hour, each car in a train, or each additional car, was the equivalent of about 30 tons of weight hauled. These results were obtained on the Chicago division. On the Cleveland & Pittsburgh division it was found that the equivalent in tons of each car was not so great, being about 6, but the speed was 13 miles an hour, and the road was protected from winds. . . .

We can conclude that if the coal consumption of different engines and crews could be compared, the straight tonnage basis will not be entirely fair, and that an adjusted tonnage system will have to be used; or else the car basis could be used and an adjustment made for the number of tons hauled.

I take it that in adopting a unit as basis for comparison between railroads, one will have to be selected that can be applied generally to the cost of operation. This being the case, it seems to me that the ton mile is the best that can be had at the present time, the ton being made up of the total weight moved, namely the engine, the car and the lading, so that the cost of any item, whether in transportation, maintenance of way, or motive power department, will be measured by the total weight multiplied by the miles through which it was moved. For example: the cost of track work, of trainmen's wages, and locomotive or car repairs, would be measured by the ton-mile.

Mr. J. F. Deems (C., B. & Q.): The rates for the different parts of our road were obtained by actual tests for the various kinds of trains. In the first place our tests covered only loaded cars and we used the same tonnage for all empty freight trains, but we soon found that this would not do in every-day practice and were compelled to reduce the tonnage for mixed or empty car trains about 20 per cent.; in fact, we made a limit to the number of cars to be hauled in any mixed train regardless to the tonnage. This was necessary on account of the increased train resistance at anything like proper speed and not because the same tonnage could not be hauled in empty as in loaded cars if we could give enough time, but it was found to be impracticable to do this. As to the method of loading: For all loaded cars, whether partially or fully loaded, the weight of the contents is marked on the way bill by the agent and to this the conductor adds the light weight of the car, thus getting approximately the actual weight, and concerning empty cars a circular was issued, showing the weights for different classes of cars, these figures being used by conductors in making up trains; but as stated before, we were obliged to abandon this.

It was found impracticable to cover the varying conditions of weather with any hard and fast rules. Considerable latitude must be allowed the conductors on this point and a proper check must be kept to see that they do not take advantage of such privilege. I think it important to have train-masters, road foremen and others spend a good deal of time on the road during bad weather and check up the tonnage and note carefully in a book the condition of the weather, the direction of wind, etc., also to note how the engines handle the trains. This book will often aid in clearing up disputed points and the knowledge among train and enginemen that such record is kept will do much to "aid" them in hauling a maximum train at all times.

As to the question, "How does the subject particularly interest master mechanics?" It interests master mechanics in a general way from the fact that it means a considerable economy to the company by loading engines more nearly to their maximum capacity in the direction of heaviest traffic and thus reduces the number of trains, but in my opinion it interests them particularly because it results in more economical operation of locomotives both as regards fuel and stores and also conduces to more efficient work by engines and crews as measured by any proper unit.

Much has been said about the proper rating of locomotives to secure maximum fuel economy, and many will claim that so far as this particular item is concerned it is quite easy to overstep the line where economy ceases and waste begins, but it seems to me that limited as we are in the matter of speed, that is we must not run at too slow a rate of speed, this position is entirely untenable. I am firmly of the opinion that the last ton hauled is the cheapest. I believe this to be true not only as regards fuel, but as applied to almost all stores and also to repairs, for it seems to me quite evident that the greater the number of ton miles of paying freight in proportion to the ton-miles of the locomotive itself, the greater the profit.

There is one question which, while it is not strictly appropriate, I believe is worth mentioning in this connection. In using the car mile unit for keeping our fuel performance sheets and in attempting to check the engineers up closely we discovered that our figures were not reliable in this particular. If Engineer Jones had made a total of 80,000 car miles and 60,000 of them were made by empties reduced to loads at three empties to two loads and the other 20,000 were actual loads, his record would be far below that of Engineer Smith, who had made the same total car miles but with the conditions reversed. We followed this matter for several months, and these facts stood out so plainly that I began to hesitate about "jacking a man up" for a poor coal record. This may not be exactly pertinent to the question of

tonnage rating, but I am inclined to think that even though we are using the ton mile instead of the car mile unit, this same trouble would be experienced as between empties and loads, and it is a matter that should be worked out so that the term "ton mile" would mean the same in all cases, which is far from true as we now use the car mile.

The Von Borries Intercepting Valve.

The following is a description of the latest type of intercepting valve used on the Royal Prussian State Railroads, as designed by Mr. A. Von Borries, taken from "*Glaser's Annalen für Gewerbe und Bauwesen*," of April 15, 1896:

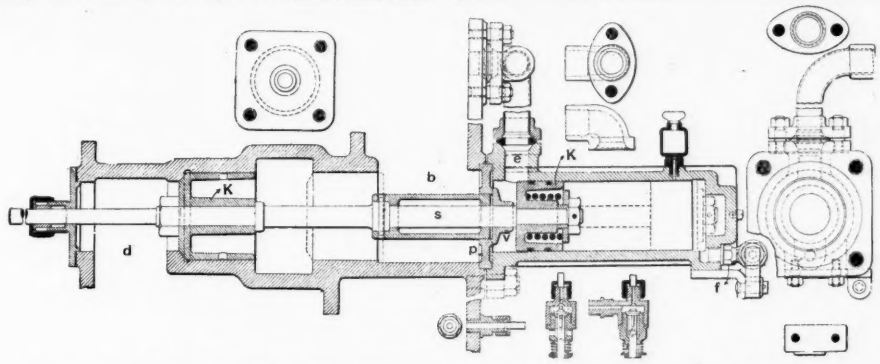


Fig. 3.—Von Borries Intercepting Valve, Compound Express Locomotives—Prussian State Railroads.

The variation in the drawbar stress which can be obtained with a compound locomotive is less than with a simple locomotive, because with the former the cut-off can be varied only from 30 to 75 per cent in the high-pressure cylinder, while in the latter the variation permissible is from 10 to 75 per cent. in both cylinders.

The drawbar stress obtained with the compound locomotive at the shortest permissible cut-off is about 50 per cent. of the locomotive's maximum drawbar stress, while with the simple engine working with its shortest allowable cut-off the drawbar stress is about 25 per cent of its maximum.

If one considers that the cylinders of the compound locomotive are so designed that with the average load the engine is run with 40 per cent cut off and the simple engine with 25 per cent. cut-off, it is apparent that the maximum drawbar stress of the former is only about 1¼ times the average drawbar stress, while in the simple engine the maximum is twice the average.

To obtain a large drawbar stress with the compound locomotive, without abnormal enlargement of the steam cylinders, is only to be attained by changing the compound action into the action of the simple engine at such times when the maximum power is needed. This practice was first recommended by Mr. A. Mallet.

With this means of obtaining a maximum drawbar stress, the cylinders can be made of sizes suitable to produce the average drawbar stress, whereby the greatest possible economy and capacity are obtained.

With this end in view, the endeavor has been to produce the simplest, cheapest and most easily handled apparatus which will effect the change from the compound to the simple action, and the intercepting valve shown in the accompanying illustrations, represents the latest developments in this line.

As will be seen, the intercepting valve consists of a casing in which works a double piston, *Kk*. The passage for the exhaust from the high pressure cylinder is marked *A*, the connection leading to the low-pressure cylinder is marked *B*; *D* leads to the exhaust nozzle; *E* is a connection to the live steam in the boiler.

The chamber behind the piston *k* is connected with the live steam in the main steam pipe by means of a regulating valve, *f*, operated by a lever from the cab. Pistons *K* and *k* are both attached to the same rod, *s*, which passes through the intermediate plate *P*.

If steam be admitted back of piston *k*, through the regulating valve *f*, the pistons take the position shown in Fig. 1. The steam pressure in the intermediate reservoir *b* holds the piston *K* to its place, and the excess pressure in *e* forces the movable valve *v* to its seat on the plate *P*.

The steam leaving the high-pressure cylinder enters the intercepting valve at *a* and passes through *b* to the low-pressure cylinder. The locomotive, therefore, works as a compound engine.

If the regulating valve *f* is closed the steam confined back of the piston *k* escapes through *f* and the pressure on the front of this piston, due to the steam entering at *e*, being in excess of the pressure on piston *K*, both pistons are pushed into the position shown in Fig. 2.

As the position of the double piston is regulated from this moment on by the equalization of pressure upon both pistons, in the same way they regulate the passage of live steam from *e* to *b*, so that the pressure acting upon piston *K* is inversely to the pressure upon *k* as the surfaces of the pistons. The pistons act, therefore, as a pressure-reducing apparatus, so that live steam with appreciably diminished pressure is conducted to the low-pressure cylinder and an equalized performance of both cylinders is obtained. The steam leaving the high-pressure cylinder reaches the stack through *d*. The locomotive, therefore, works as a simple engine for this position of the intercepting valve.

If the regulating valve *f* be again opened, the pistons are returned to the position of Fig. 1, so that the compound action is restored. The change can be made at any time.

Figs. 1, 2 and 3 shows the intercepting valve as used by the Royal Prussian State Railroads for compound express locomotives, while Fig. 4 shows the intercepting valve as applied to compound freight locomotives.

These valves embody several improvements over the earlier types by means of which the following objectionable features have been eliminated:

1st. In the first valves the piston bushing was broken, due to condensed steam collecting back of piston *k*, while working as a compound, against which the piston struck violently upon changing to the simple action. To avoid this, the small steam pipe leading from the regulating valve *f* is given a slope, and is made sufficiently large to drain this chamber. To reduce condensation, this end of the valve is supplied with a metal casing as shown in Fig 4.

2d. The piston *k* was broken by striking against the end of the cylinder. This is overcome in the new valve by means of the spiral spring shown in Figs. 3 and 4.

3d. The pistons stuck fast in their cylinders. This was due to insufficient oiling or total neglect, and the same trouble arose where the water in the boiler was very dirty. With proper care these objections are removed.

4th. A loosening of the nuts upon the valve rod has occurred only with the older styles of construction, in which cases the larger piston was loose upon the rod.

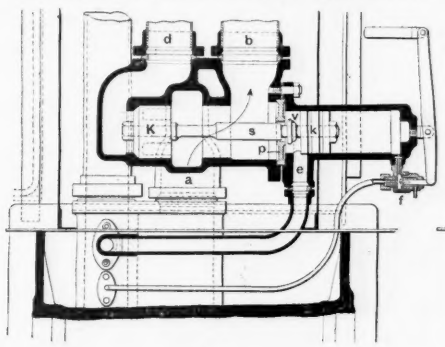


Fig. 1.

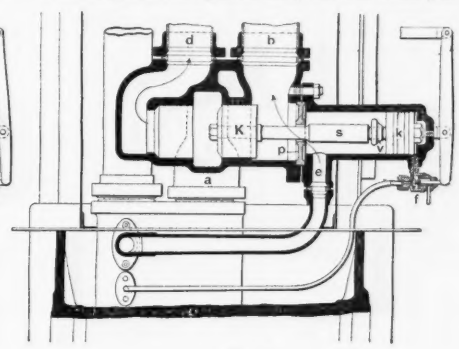


Fig. 2.

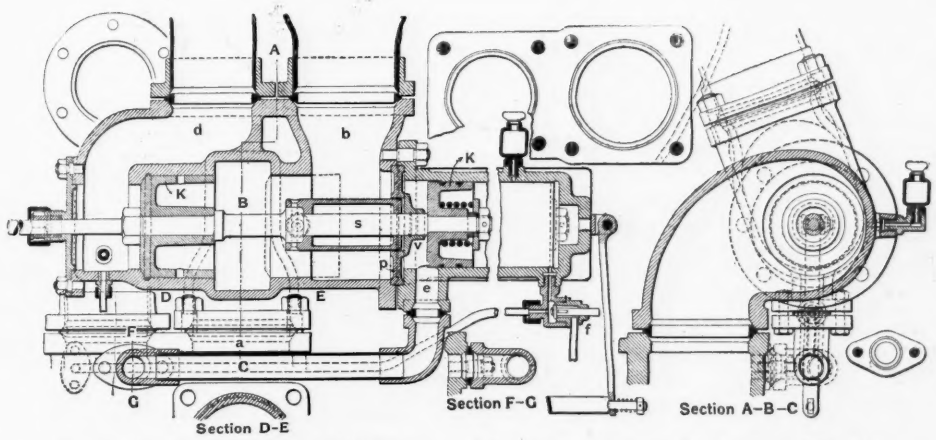


Fig 4.—Von Borries Intercepting Valve, Compound Freight Locomotives—Prussian State Railroads.

With the present valve both pistons are attached firmly to the rod which carries the movable valve *V*.

To prevent breakages the changes given under 1 to 4 are recommended for the older valves.

In this intercepting valve it will be seen that the piston rod is extended through the rear casing, making a better form of construction.

The M. C. B. Coupler in Use.

At the November meeting of the Western Railway Club there was a discussion on "Recent Developments in M. C. B. Couplers." The following verbal report was given by Mr J. N. Barr, chairman of the committee:

Mr. BARR: It was the understanding of the committee in the first place that the idea was to treat of recent developments in the construction of couplers. We have changed the topic and call it "Recent developments in the use of couplers." There have been a number of weak points doubtless noticed by all that require some attention, and possibly the most important of these is the tendency of couplers to become accidentally uncoupled from some mysterious cause. As throwing some light on this subject, I have had a statement made out of cases of M. C. B. couplers becoming uncoupled on the C. M. & St. P. Ry., during the months of August and September, 1896.

It would seem that the uncoupling arises from either the creeping or jumping of the locking device, and it does not seem to be confined to any particular make of coupler. In fact, I believe coupler makers and coupler inventors, up to quite recent times, have paid no attention whatever to the matter of preventing uncoupling in service, and our reports would indicate that there are a great many couplers in perfectly good condition that become uncoupled.

. . . If we could eliminate from our cost of wrecks and damage on the road the money which we spend to repair damage caused by trains parting, and to a great extent to couplers uncoupling, we would reduce our expenses materially.

The statement which I have gives, for the month of August, 26 cases. Three cases show chains too short. . . . We have one case of a worn locking block; one case of a lock pin raised, and if I remember the details of this case rightly, the trainmen actually watched this pin rising until the cars uncoupled, after they had uncoupled the first time. We had 21 cases in which the cause was not determined.

In the month of September we had 36 cases, six cases in which the lock raised, three in which the lock device was worn out, one case of a guard arm which was too open; one case of lifting, the chain too short; one case of a wrong knuckle, and 24 cases in which no explanation or cause could be definitely ascertained. During this month we have 12 cases in which we have a sort of an explanation of the phenomena and only six cases in which there was anything which could be considered an actual defect in the drawbar, making six cases out of 36 which we understood, leaving 30 cases of uncoupling with apparently no defect in the drawbar whatever.

There is another important matter connected with this subject, and that is the variation in the length of the guard arm. The Master Car Builders' Association has not fixed any limits as to this, and an inspection or measurement of couplers will show a very decided difference in the length of guard arms. Now this is of more importance than would strike one a first sight. Of course the coupler with the short guard arm is the one that is going to show best on our records in the matter of guard arms breaking. In addition to deceiving us as to the relative strength and merits of the two couplers, another important and very practical point is in connection with the force required to break the guard arms. . .

The difference of a half-inch in the length of a guard arm will theoretically compel us to put those cars together with one-half the force that could be used in case they were both the same length, if we want to prevent the breaking of the guard arms. I am inclined to think that until there is a rigid rule in the matter of guard arms, or rather when a rigid rule is established as to the length of the guard arm, our loss from guard arm breakage will be decidedly less than it is with the present unsatisfactory condition of affairs, and it is my opinion that we ought to ask the executive committee to take the matter up with a view of settling on some satisfactory length of guard arm to which all should agree. It certainly should be taken up at the next meeting of the executive committee of the M. C. B. Association, and it should be put in such shape that a standard may be established at the next meeting of the Master Car Builder's Association.

Mr. C. A. SCHROYER: I have observed a difficulty in the use of automatic drawbars, in which the double notch is used in the locking block, the object of which is to enable them to be coupled on a curve. I am not prepared to fix the difficulty positively at that point, but I have seen bars become detached where both bars were found to be locked perfectly, and the only way in which I could account for the uncoupling was the fact that one of them, or sometimes both of them, were provided with a double notch in the locking block which, when coupled on a curve or on a tangent, when the blow is not too hard, will force the incline around until the locking block will drop down on the first notch. It does not close the knuckle entirely, but the strain is taken on the bar, and they go out into

service in that manner, partially coupled. I consider that an objection.

Another point that I have observed in the recent developments in the use of the automatic coupler is the destruction of links and pins and the consequent destruction of knuckles. There is a prevailing practice among train crews in switching to leave the link always in the automatic coupler. The result is that there it hangs at an angle, and when it comes in contact with another coupler it bends downward, which not only destroys the link, but bends the pin. This difficulty continues until finally the bending of this pin causes the destruction of the knuckle, and not only that, but the link and pin are destroyed as well, so that with the large number of automatic couplers that we have in service to-day, we do not notice a very marked decrease in the number of links and pins used. The continued demand for links and pins is due to the destruction of them in that manner. I think that is a thing that can only be remedied through the operating department.

Mr. Barr: Mr. Brazier sends a statement of failures of automatic couplers and knuckles for the year ending Sept 30, 1896. It gives the usual list of bars broken, arms broken off, etc. It also gives a total for the year of 690; with 8,300 cars equipped there were 494 broken on company's cars, and 196 on foreign cars. There were 1,376 knuckles broken, 385 on foreign cars and 991 on the Illinois Central cars. The largest proportion of breakage is confined to 219 upper lugs broken off; the next largest is number 116, "Barrel off at shoulder." The next is 88, face split. Out of 1,376 knuckles 548 had the upper lug broken off, 256 the lower lug broken off, 159 both lugs broken off, which makes over half the number of breakages.

I was going to speak of the question of whether in the recent developments in the use of couplers, it would not be good economy to make some rule in operating the cars in regard to having the knuckles always open. I am of the opinion that a guard arm cannot very well be broken off if one or both of the knuckles are open, and I am inclined to think, too, that it is almost impossible to break a guard arm fitted with an M. C B coupler unless both knuckles are closed. Now, this would be somewhat of an argument for the coupler makers who have devices that open the knuckles. From the observations which I have made in the use of couplers, I believe that a large portion of the breakage would be avoided if the knuckles were always open when the cars are uncoupled and maintained open in that way.

Mr. J. W. Cloud: I would ask Mr. Barr whether he knows, from the reports of trainmen, how many of the 21 unexplained cases in August and of the 24 similar cases in September had both knuckles closed and locked after the uncoupling occurred. Such a knowledge would indicate whether the couplers unlocked, or whether they slipped apart vertically or otherwise, while remaining locked.

Mr. Barr: This represents the records of only two months. I have been following this up for over a year, and there is only one case in which that question was raised and that was on a branch line, where we do not run 50 miles an hour. I presume the track was pretty bad. The train crew ventured the opinion, without apparently being able without actual observation to say positively, that the two couplers slipped apart vertically instead of uncoupling.

The Le Chatelier Water Brake and the Sweeney Air Compressor.

For the information of numerous readers who have inquired concerning the construction of the "water-brake," we give herewith an engraving showing the standard arrangement of power-brake connections on the locomotives of the Southern Pacific, which includes the usual Westinghouse apparatus, the water-brake connections, and the pipes for pumping up a supply of air by using the cylinders and pistons of the engine when it is running down hill, with steam shut off. This last arrangement, known as the "Sweeney brake," was devised by Thomas Sweeney, a locomotive engineer of the Southern Pacific.

In the drawings, the pipes for the water brake, running from the cab to the exhaust pipes at the front end of the engine, are shown in solid black lines. The main pipe is ⅛ in. in diameter, and the two branches at the front end are ⅜ in. The pipe for the Sweeney air compressor, connecting the steam chest with the main air brake reservoir, is 1¼ in. in diameter, and is shown in solid black lines, heavier than those showing the water-brake apparatus. The flow of air to the reservoir is regulated by a 1¼-in. valve immediately above the steam chest, which valve is worked by a handle in the cab, connected to the valve by a long rod. The engravings are so clear that, with the following extracts from the company's regulations, no further description will be needed.

Rule 55. The "Le Chatelier," or water-brake, is intended to be used as an auxiliary to other brakes, and, when used with discretion, is a valuable aid in steadying a train down mountain grades. It is most effective on a steady motion of from three to 12 miles an hour, above which latter speed it is of lessened value. It should not be used at a greater speed than 18 miles per hour, *and is for mountain work only.*

56. Water is led by a small pipe connected to the boiler, below water line of same, to the exhaust-pipe cavity and through to the cylinders. This affords a counter pressure on pistons when engine is reversed. The reverse lever should be just back of the center notch of quadrant. The act of forcing compressed moist vapor—which the water jet drawn into the cylinders with engine reversed supplies—back into the boiler, causes a retarding force on pistons, which, operating through the connections on the crank pins, gives the desired brake power. Only a very small amount of water is used, a portion of which, all except that converted into vapor and returned to boiler, passes through the open cylinder cocks. The *amount* of brake power exerted depends upon the *position of the reverse lever.*

57. In operating the water brake, first have the engine in slow motion without steam; have cylinder cocks wide open and keep them open, with reverse lever placed one notch back of the center, and throttle securely shut. Give the small water cock one-eighth of a full turn open, and see that steam water passes the cylinder cocks freely.

58. The speed may now be regulated by placing the reverse lever back as required. This should be done without any change in the water cock. A too free use of water is dangerous to cylinder heads, and water may be forced out of the smokestack, producing no useful effect.

59. In shutting off the water-brake, throw the reverse lever ahead slowly, *first closing the water cock*, to avoid throwing water from the stack.

60. It must be remembered that the water-brake acts on the drivers, and that the combined use of water and driver brakes will be too great, causing the sliding of wheels, hence the combined use of water and driving brake must not be made, except as provided in rule 62.

61. Light engines, when fitted with air and water-brakes, are best controlled by setting the water-brake moderately and using the air-brake to regulate speed.

62. In case of necessity, the water-brake, the air-brake and all other available means may be used together

When two engines are coupled to trains descending mountain grades, the engineer not operating the air-brake must assist in retarding speed by using the water-brake to some extent, with the view to preventing flat and heated wheels. The water-brake should not be used at a greater speed than 18 miles per hour.

63. The Sweeney air compressor is a device attached to engines as an auxiliary for maintaining air pressure in train pipes in case of failure of air pump, and for recharging when descending mountain grades.

64. This device consists of a valve and a spring to resist a pressure of 90 lbs. attached to top or side of steam chest; a globe valve placed between a safety valve and the steam chest, this valve being operated from the cab of engine; and a discharge pipe connecting steam chest and main air reservoir. In the discharge pipe is placed a check valve, preferably close to main reservoir.

65. When it is necessary to use the device, *steam being shut off*, the reverse lever is placed slightly back of center notch, and the cylinder cocks left open for three or four revolutions of the engine to allow water that may be in the cylinders to escape; then open the globe valve and place brake valve in charging position.

The reverse lever must be left back of center notch at least 15 seconds after full pressure has been indicated on the air gage.

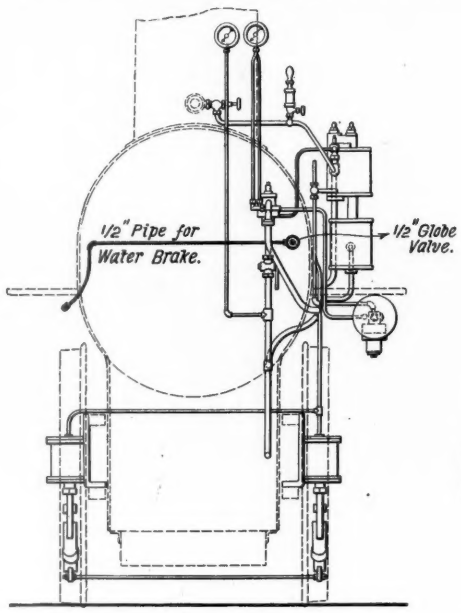
66. Then before the reverse lever is moved forward, place the brake valve on the lap; and, in case the air pump is not working, the globe valve should be closed, as the pistons will draw air from the main reservoir before the check valve will close.

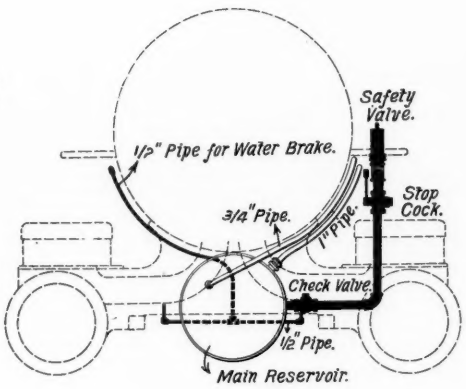
67. By placing the brake valve on the lap and closing the globe valve before moving the reverse lever forward, sufficient pressue will be retained in the main reservoir to release the brakes.

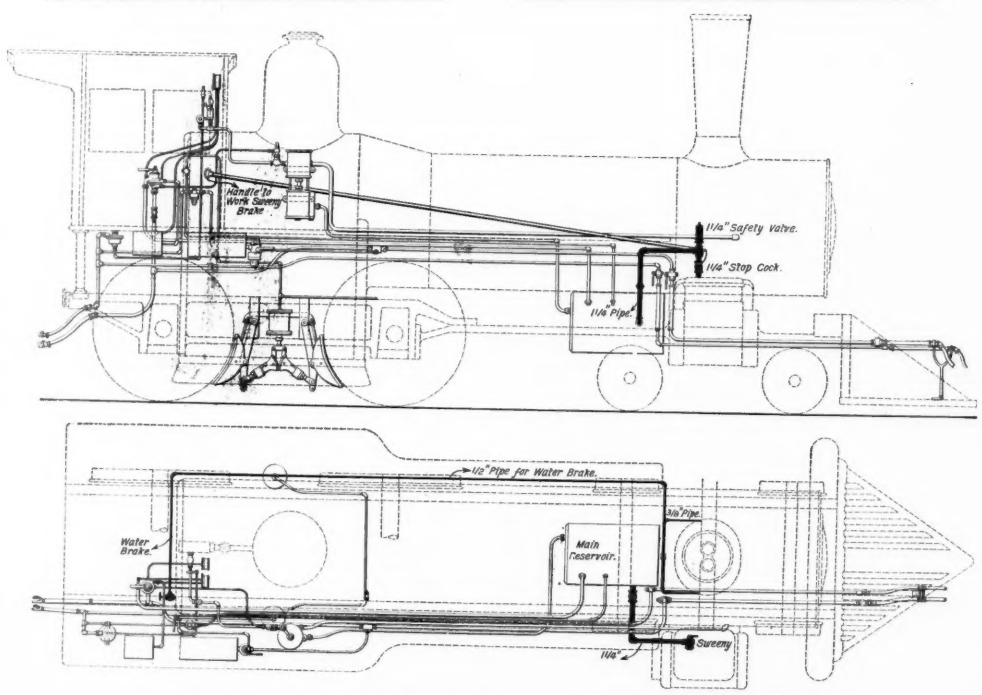
68. After the air compressor has ceased to work, the brake valve should be left on the lap at least five seconds so that the air in the train will have time to equalize. If air is used immediately after moving the lever ahead, there being a higher pressure in train pipe than in auxiliary reservoirs, air will be wasted, as the air in train pipe must be reduced to a lower pressure than that in auxiliary reservoirs to set the brakes; but, if time be allowed to let the air equalize, all air that has been forced back may be used to advantage.

69. Steam must never be used through the Sweeney device; and engineers must use great care to prevent opening of globe valve when working steam and promptly report any leakage of globe valve.

This device is to be used only in case of emergency.







Pipes for Water Brake and Auxiliary Air Compressor, on Southern Pacific Engines.

Speed of "Sand-Track" Switching.

The query having been made by the Engineer of Maintenance of Way of a prominent American railroad, as to the speed of switching possible with the sand-track gridiron in the Dresden-Friedrichstadt shifting-yard, and doubts having been expressed as to whether the sand-track method was fast enough for American ideas and practise, I beg to offer for public information a few words upon this important topic.

It might seem, on first glance, that, as my correspondent suggests, the sand-track, which has been so rapidly developed at Dresden from a subsidiary to a principal *role*, would be adaptable in America only for derailing switches (for which purpose it was originally devised), but would not be suitable for switching-tracks, because no yards in America are operated in the manner practised in Friedrichstadt or at Edgehill. The question is whether gravity switching is or is not slower than that done by locomotives or horses.

I maintain that the figures are in favor of gravity as a means of rapidly breaking up and making up trains. In moving a train on a long gradient each car is its own motor, and it is possible to effect the various movements as fast as the switches can be thrown—this operation being the sole limit of speed, and the gravity method permitting the attainment of this maximum. By the poling system, every group of cars requires to be set going by the shifting engine, which then must be stopped, reversed, and again stopped before being available for moving another car or group. Observations at Altoona show a minimum period of 30 seconds for every movement, whereas the cars do not require more than 16 to 20 seconds (a period which, if required, could be further reduced) to run down a grade.

Experience in the Dresden-Friedrichstadt yard shows that the number of cars daily switched since the sand-track was described in the *Railroad Gazette* (July 31, 1896) has increased from 2,000 to 2,600. In comparison with this, take the switching station at Harrisburg.

It has a length of about 2¼ miles and four groups of tracks containing 14 to 30 tracks each. I have no recent statistics, but in 1892 there passed here 727,083 loaded cars eastbound, and 176,714 westbound; that is an average of 903,817 ÷ 365 = 2,480 cars per day, which is not up to the Dresden-Friedrichstadt performance. In addition, it must be noted that the eastbound freight on the Pennsylvania Railroad consists largely of coal cars bound for the New York district, and that therefore there are but few separations needed at Harrisburg. In one case, observed by a party of Bavarian engineers, a group of 25 cars went through without being uncoupled, and a train of 65 cars was broken up into but nine parts.

But after the cars are poled they are not yet made up into a train; they require either to be collected by a shifting-engine, if shifting and rearranging according to station order is necessary; or to be shifted a second time if part of the cars are destined for way stations, as in Germany.

The great number of divisions into which the trains at Dresden-Friedrichstadt—and still more at Edgehill—absolutely requires the use of "gridirons"; and the necessity of moving the cars with interruptions on the gridirons calls on the one hand for a strong gradient, and on the other for a variable means of slowing up the car speed according to the conditions of wind and weather.

The apparent emptiness of the Friedrichstadt yard as shown in the view published in the *Railroad Gazette* does not indicate either waste room, or limited handling capacity, or light traffic. The same may be observed at Edgehill. In Friedrichstadt, as at Edgehill, every train, as soon as it arrives, is run up to the top of the grade and then shifted. The made-up trains are collected on special tracks, and pull out according to the time-table or instructions; so there is no over-stocking.

Switching by gravity may be especially desirable or even necessary in cases where the railroad already has an inclined tract of ground (which was the case at Edgehill) or where there appears the necessity of disposing cheaply of a vast amount of excavated earth from an artificial harbor basin, as at Friedrichstadt.

The gravity sand-track very materially lessens the noise of switching and the wear and tear of car-frames, and more especially of couplings, draw bars and brakes; while the danger to human life in American yards (which are less frequently closed to the public than in Germany) is much less. The damage to cars is much less in the case of trains or groups in which "empties" come between heavily loaded cars than where the reverse is the case.

I may add that in the issue of Oct. 31 of the *Centralblatt der Bauderwaltung*, Mr. Sarre, of Berlin, Director of the German governmental railroads in Alsace-Lorraine, proposes the use of the sand-track in terminal stations to avoid the destruction of the buffers by runaway or fast-running cars, as, for instance, in the Montparnasse (elevated) station, Paris, where a train went through the end wall of the building and fell to the street, and at the Central station, Cologne. In the latter case, in May of this year, even a buffer with hydraulic pistons nearly 8 ft. long failed to stop the train. Director Sarre gives a drawing of an automatic electrical contrivance which withdraws a bolt and thus causes the opening of a sand-switch by a counterpoise. The first wheel of a car or engine which overruns its limit presses two successive levers which, if the time in moving between them is too short, throw the bolt and thus save the train and the buffers or station.

ROBERT GRIMSHAW.

DRESDEN, Nov. 18.

The First London Railroad.

Just 60 years ago the present vast network of the London railways had its humble beginning in the opening, so far as Deptford, of the London & Greenwich Railway. The company's original prospectus is dated September, 1832, but another scheme, which perished in the commercial panic of 1825, had been projected nearly eight years before. On May 17, 1833, the Greenwich Railway Bill received the royal assent, the large sum of £400,000 being the authorized capital for about 3½ miles of line. The reason for this heavy expenditure lay in the cost of land, partly covered with buildings at the London end, and the necessity for having a viaduct the whole way.

By the middle of 1835 a mile of single line was open, and an engine named Royal William, built by Charles Tayleur & Company, of the Vulcan Foundry, near Warrington, in Lancashire, ran experimental trips upon it. Many of the leading scientific men of the time went to see it and amused themselves by placing glasses of water on the stone-block sleepers to see if the passage of the engine would spill them or not. On Feb. 8, 1836, just over two miles of double road was brought into use for public traffic between Deptford and the Spa Road, Bermondsey. This was worked very successfully throughout the year, the number of passengers soon rising to 30,000 or 40,000 per week with a limited train service. It was not until Dec. 14, 1836, that the London terminus, close to the south end of London Bridge and nearly a mile from Spa Road, was opened for traffic. Much ceremony was used on the occasion, as befitted the inauguration of the first metropolitan railway.

On this occasion the company's six engines and 40 coaches were all present. The engines were named Royal William, Royal Adelaide and Princess Victoria, after the King and Queen and her present majesty; Dottin Twells and Walter, after the chairman and two of the directors. With one exception, they had only four wheels, inside cylinders (in three engines 10 × 16 in.), and most had tenders. Two, however, built by Forrester & Co., of Liverpool, had tanks under the boiler, outside cylinders 11 × 18 in., working cranks keyed on the driving axles beyond outside bearings. Messrs. Braithwaite & Milner, of London, built three of the engines, including the six-wheeler. They must have been curious-looking machines, for the frame of one is said to have resembled a Roman galley. All the six engines had 5-ft. "single" driving-wheels. The boilers contained from 66 to 82 tubes, equal to about 250 sq. ft. of heating surface, and some 75 ft. more were provided in the firebox.

Houses Under the Viaduct near Deptford—First London Railway.

Lowness of center of gravity being considered most important at that time, the coaches had their frames below the axles so that in case of a broken spring or axle, the end cross pieces of the frame bore upon the rail, and acted as a brake. Being so low, however, the coaches were very noisy, this defect being heightened by the reverberation from the parapet walls, and the rigidity of stone-block sleepers set in concrete instead of ballast. No doubt this was to prevent the tendency of stone-blocks to spread apart, but they caused so many broken axles, and the horrible noise so injured the popularity of the line, that wooden sleepers and ordinary ballast were soon put down. The coaches were extremely small, low and cramped, the first-class generally had one central compartment and a half-compartment or coupé at each end; the second-class consisted of one large compartment with the seats all round and a door on each side; while the third class, as usual, were simply open boxes. No buffers or screw couplings were used at first, only iron bars or links with an eye at each end.

The Greenwich Railway viaduct consists of about 1,000 arches and bridges, the ordinary arches being 18 ft. span and about 20 ft. high on the average, with piers 3 ft thick. Some of the latter have an opening in them, nearly all are occupied in some way, as storehouses, stables or workshops, but it was expected they would let as houses and shops and that the whole affair would be a sort of railway street. The line being much shorter than the highroad, a strip of land 75 ft. in width was taken for it from near Spa road to Greenwich. The 25 ft. on each side of the arches was to give access to them and also to provide a carriage and footway, for the use of which a toll of one penny was charged. This brought in about £1,000 a year at one time, but has long been given up except at a foot-bridge over Deptford Creek. Here is a curious opening bridge in the railway, worked by balance-weights, but it is now seldom used.

The extension to Greenwich, only half a mile beyond Deptford, was not opened until Dec. 24, 1838. For nearly 40 years Greenwich was a terminus, but the line now goes on to Woolwich, and the old station has disappeared. Deptford station alone retains some original features, especially a winding staircase and a bridge supported upon 12 Grecian columns of stone. The company's workshops used to be under the arches here. A sloping road or approach, joining the station at a right angle to the line, still exists, but it is disused and built in with houses. It is shown in the engraving, but the trees and gardens in the foreground have long vanished, and no arches are now used as dwellings. The London Bridge terminus now forms part of the site of the South-Eastern Railway station of that name. The viaduct simply widened out for three lines of rail and then ended with barrier gates and turnstiles, where passengers purchased or gave up the metal disks which served for tickets. A short open space and a flight of steps down to the street completed the station.

The London & Greenwich Railway was designed by Colonel Landmann, of the Royal Engineers, on the expectation that lines to Dover, Brighton and other places would have to use it for access to London and pay smartly for the privilege. The Croydon line began to run over it for 1¾ miles in 1839, diverging at Corbett's lane, where probably the first signal-box in this country was erected. The South-Eastern and Brighton lines also coming to London Bridge in 1841, with a separate terminus, the viaduct was widened to carry two more lines of rail so far as Corbett's lane, and the junction crossing was avoided. The Greenwich had to pay for it, but demanded so heavy a toll that the South-Eastern and Croydon lines soon made a line of their own to avoid it. This widening and other things brought up the cost finally to nearly a million sterling, on which the company was never able to pay any but very small dividends at irregular periods. On January 1, 1845, it was leased to the South-Eastern for 999 years, at a rental of £45,000 a year, and now only exists to receive its dues.

The trains on the Greenwich line, contrary to the universal custom in this country, have run upon the right-hand line instead of the left, from its earliest days to the present time.

W. B. PALEY.

LONDON, Nov. 28.

An Automatic Weighing Machine.

The Pratt & Whitney Company, of Hartford, Conn., whose new automatic weighing machine was made the subject of an illustrated article in this journal several months ago, has recently brought out a new style of the weigher furnished with a power-feed apparatus for supplying the material to the weighing mechanism. This power-feed machine is especially adapted for weighing slow-running materials, such as coal, broken ores, salt, fertilizers, cotton-seed and cotton-seed meal, one interesting application of it being the mixing of cement materials. For this purpose, a pair of weighers of the proper relative capacities is set side by side, and connected for simultaneous discharge, so that by regulating the load-weight of one of the weighers—usually of the smaller one—any required proportion of mixture may be obtained. This multiple arrangement of the weighers is also adapted for mixing grain in milling establishments.

The feeder, or supply apparatus, comprises an endless belt or conveyor, composed of a pair of drive-chains and a series of over-lapping slats, or bars, pivoted at one edge to the chain links. On the upper side of the conveyor the bars lie flat to form a continuous surface, but on the lower or return side the bars swing down and so leave openings for the escape of any material that may have accumulated within the conveyor. The feeder belt is operated by belt-driven shafts and gearing having two speeds. When a load had been discharged, the return movement of the bucket-closer shifts the high-speed driving belt which then operates the conveyor, rapidly supplying material to the bucket, until the major part of a load has been received therein. At this point the bucket partially descends and shifts the slow-running belt into action for slowly operating the feeder and supplying the "drip" to complete the load. When the weighing mechanism is thus brought to a true poise, the feeder is instantly thrown out of action and a valve brought into position to retain any material that may accidentally pass over the discharge end of the feeder-belt after the poising has been accuractely effected.

All sizes and styles of the new weigher are furnished with "interlocking stops" operating between the supply apparatus and the load discharging devices. These interlocks positively prevent any material from passing through the machine without its operating normally, since the supply valve cannot begin to open until the discharge valve, or "closer," is fully shut, and *vice versa*. This safety mechanism is one of the leading features of the new weigher, and is said to be covered by numerous and fundamental patents.

New Burlington Station at Omaha.

The Chicago, Burlington & Quincy has decided to build a passenger station at Omaha, and the plans for the structure will be made as soon as possible. The proposed location is at Tenth and Mason streets, and the tenants, including several railroad companies, now occupying the grounds, have been notified to vacate by March 1. It is proposed to hold a Trans-Mississippi and International Exposition at Omaha in 1898, and the necessity of preparing for the extra traffic to be expected at that time is one reason for preparing at this time for a station independent of the other roads. The construction of a new Union station at Omaha has been under consideration several years, and, indeed, a building is half completed; but in consequence of disagreements with the city and the insolvency of the Union Pacific work was stopped, and for a long time matters have been very unsettled. At present a temporary building is used as a Union station. The Burlington has made demand that the Union Depot Co. be dissolved, having given up hope of accomplishing the purposes for which it was formed. At the same time it is announced that the new station will be made large enough to accommodate any and all roads which may seasonably indicate their desire to use it on equitable terms. The location is not far from the unfinished Union station. Difficulty in securing ground for approaches sufficiently free from grades and curves have constituted a main reason for the failure to complete the Union station.

The Burlington announces that it will contribute $30,000 toward the proposed exposition, $15,000 being subscribed by the Chicago, Burlington & Quincy and $15,000 by the Burlington & Missouri River.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

David Leonard Barnes died in New York City on Tuesday morning of this week, after an illness of several months. It is almost exactly eight years since he joined the editorial staff of the *Railroad Gazette*, a young engineer, barely 30, full of bright hope. In those eight years we have seen reveal itself and expand, a mind of remarkable energy and power, and a character full of charming and noble qualities. We propose next week to say something of Mr. Barnes' career and personality; now we merely announce his untimely death.

The Joint Traffic Association Managers have passed a resolution to the effect that roads in the Association should make no contributions to fairs or exhibitions, or to societies, clubs or other similar local or general enterprises. This action doubtless indicates that such grants of money have heretofore been used for the purpose of cutting rates. This prohibition is commendable. Slowly but surely the Managers are discovering the secret leaks which have designedly been kept open as convenient instrumentalities for influencing traffic, and if they have their way they will get the holes all stopped up. Cartage, charity rates, mileage on private baggage cars, and a hundred other things which are little in themselves, but which will disturb rates as surely as a premium of half a cent on gold will empty the United States Treasury, have been brought to the light, and made to justify themselves or give up the ghost. But as regards donations, how about big grants like those of $50,000 or more that the Chicago road made to the World's Fair? One of this kind has just been reported in the West. Probably these do not affect competitive traffic, at least not definitely enough to be made the basis of action in the traffic associations; but there is an important principle involved. A $30,000 contribution to an exposition generally has one important characteristic, however, which, if present in all other "donations" made by railroad companies, would make the work of traffic associations much lighter; it is open and known to the public.

"Burdens on Traveling Salesmen" and the necessity of removing them, is the subject of a column article in the *Journal of Commerce* of December 14. The particular burden referred to is the extra baggage charge which the drummers have to pay; and the New York Board of Trade & Transportation, the body which several years ago wanted the railroads to abolish carload rates on freight, is going to ask the Joint Traffic Association to reduce extra baggage charges, provided it finds that the burden does actually exist—a point which it is going to investigate. The main argument offered is that drummers sell merchandise which gives business to the freight trains of the road, and that, therefore, they ought to be allowed to carry their samples free or nearly so. But what is this but a demand for a reduction of freight charges? A railroad would do better to make a direct reduction in freight tariffs, for then it would be dealing fairly with shippers who sell ten times more goods on the same amount of samples. Transportation of goods by passenger train is too costly to be "thrown into the bargain" with little or no care as to its quantity or the amount paid for it. The handling of heavy baggage is a chief cause for delays to passenger trains at stations, and it is for the best interest of the passengers as a whole that the railroads keep the rates on baggage high enough to keep the quantity down to a reasonable minimum. There ought to be a charge on all baggage. The most effective argument presented by the drummers is that the railroads do much better by theatrical companies, making for them a reduction in fares and at the same time furnishing a special baggage car. There is a fair answer to this, in the fact that 10 or 20 actors are more profitable to the railroad than a single drummer; and a special baggage car may mean no more than does the addition of an extra baggage car to a train for an equal number of other passengers. The fact that the actors' baggage goes in a car by itself does not of itself indicate that they carry an excessive amount per passenger. By using a special car the delay to the drummers and other passengers that would be caused by stopping to unload is avoided. But this fair argument is not always a strong argument, for many railroads, in meeting the demands of theatrical parties for a reduction, have often gone too far. The ticket rate is reduced, the free baggage allowance is increased and scenery is taken at rates much too low. If the show happens to have a miniature lake or a donkey or other such "property," that is included at actual weight, as though it were a plain trunk. If the railroads making such concessions had to yield a bit to the drummers no one would mourn; but, unfortunately, the road which injures itself by too radical reductions in rates pulls its neighbors down also.

Again the railroads report heavy losses in monthly gross earnings, and the decrease in November as compared with last year is much the largest so far recorded. The decrease is reported by the *Financial Chronicle* as over 4½ million dollars, or 9.9 per cent. on the $41,099,000 earned by roads working 94,094 miles. In October the loss was only 2¼ millions, equal to about four per cent. The continued depressed political and industrial conditions brought about not only a heavy loss in merchandise traffic in all sections, but the Western lines added a heavy share to the loss in revenue through smaller movements of cereals. In fact, the Southern roads alone (aided by a better cotton crop than in 1895) report any increases of consequences, but the gains on the cotton roads are not sufficient to overcome the losses of other lines in the Southern group, which, like all the others, show smaller earnings than last year. In fact, almost all show less revenue than in any of the last six years. The range of earnings by groups for 1896 and 1891, and an intermediate year, has been as follows:

	1896.	1894.	1891.
Southern	$6,410,371	$6,429,513	$6,569,334
Southwestern	5,7[illegible] 7,871	6,56[illegible],453	6,4[illegible]8,851
Trunk Line	8,2[illegible],695	8,[illegible]56,838	9,097,213
Middle Western	5,597,515	5,[illegible],053	5,342,354
Northwestern	7,152,083	7,14[illegible],365	8,39[illegible],223
Pacific	3,841,666	3,962,562	4,794,356

The roads in the Middle Western States form the only group which shows better earnings in 1896 than in the other years. The reason for the close similarity in the earnings for the three years in this group is not quite plain. Nor have we any figures of traffic movement to check the earnings. It might be added that all the groups show much better earnings in 1895 than in 1894. In November, 1895, earnings increased 3¼ million dollars, or about 6½ per cent., for then we were having a heavy grain movement. The Southern and Southwestern lines have been better off than other lines, because they were carrying to market a larger cotton crop than in 1895. Still, decreases from 1895 earnings are shown by both groups, $400,000 in the Southern and $[illegible]0,000 in the Southwestern. The overland shipments of cotton show no material variation in the two years, being about 230,000 bales annually, but in the receipts at Southern ports there is an increase of 354,000 bales over the 871,000 bales in 1895. Proceeding to the Northwestern lines we find revenue affected by lessened grain shipments. In 1895 these roads had exceptionally good crops to transport, which have not been equaled this year. The largest of the individual decreases are reported by roads in this section, which last year and early in 1896 were showing remarkably heavy earnings. The Chicago, Milwaukee & St. Paul, Northern Pacific, Great Northern and "Soo" lines between them report over $1,300,000 decrease, the St. Paul alone losing over $678,000. The receipts of wheat at Duluth were but a little over five million bushels, less than half the 1895 total for November, and receipts at Minneapolis and other spring wheat ports also fell off. The decrease in the total wheat receipts at the Western markets from 29 million bushels to 17 millions is mainly accounted for in the decrease at these points.

Recent Weights and Sections of Rails.

We have recently had occasion to inquire somewhat into the weight and section of rails rolled, with a view to get some measure of the increase of weight, and also of the standardizing of sections. The recent gain in weight is shown with more or less precision by reports received from several mills. The Pennsylvania Steel Company says that on roads of heavy traffic "the use of 60 and often of 70-pound rails has been given up, and rails weighing 85, 90 and 100 pounds per yard have taken their place. The tendency just recently has been in the direction of a 100-pound rail as the standard for heavy traffic." We get a more definite statement from the Bethlehem Iron Company. The heaviest rail rolled by that concern in 1874 was 65 pounds per yard; in 1884 it was 76 pounds: in 1886 it was 80 pounds; in 1891, 95 pounds and in 1893, 100 pounds. These weights are maximum and not average weights, it will be observed, and therefore show the *tendency* only, not the rate of progress. The report is qualitative, not quantitative. A more precise measure comes from the Illinois Steel Company, which reports *average* weights for each of seven years. In 1889 (from May 1) the average weight per yard was 63.75 pounds. In 1892 it had risen to 67 pounds; and in 1895 the average rolled was 71.08 pounds per yard. The Lackawanna Iron & Steel Company sends a very interesting table, which, however, goes back only to 1891. It shows for 1891, and for 1896, up to Aug. 15, the percentage of the total product which was rolled in each weight from 56 pounds up to 100. It shows also the percentage rolled in the standard sections of the American Society of Civil Engineers and of P. H. Dudley and R. W. Hunt. That table follows:

Weight of Rails.—South Works Lackawanna Iron and Steel Company.

Yard weight.	Percentage, 1891.		Percentage, 1896.	
100 lbs.	[illegible]		11.86	
95 "	[illegible]	0.00	3.59	20.83
90 "	[illegible]		0.30	
85 "	[illegible]		5.08	
80 "	27.90		29.70	
79 "	[illegible]		2.71	
78 "	4.01		2.03	
76 "	6.40	50.76	4.53	52.69
75½ "	[illegible]		7.31	
75 "	9.74		6.33	
74 "	0.05		0.08	
72 "	2.66		[illegible]	
70 "	19.62		13.19	
68½ "	1.06		[illegible]	
67 "	6.72	32.00	4.61	24.79
65 "	4.40		6.99	
60½ "	0.20		[illegible]	
60 "	14.30	17.24	0.34	1.69
56 "	2.94		1.35	
	100.00		100.00	

Am. Soc. C. E.	5.69
P. H. Dudley	25.37
R. W. Hunt	8.29

The experience with regard to the adoption of standard sections is conflicting. The Pennsylvania Steel Company rolls but very few rails of the sections recommended by the American Society of Civil Engineers. The Bethlehem Iron Company also reports rolling these sections only to a very limited extent. In fact, that company has got up rolls only for the 65-pound and 75-pound sections of the society. The Illinois Steel Company, however, says that 38 per cent. of its entire tonnage is now rolled to the Society's sections. The table from the Lackawanna company, above, shows that only 5.69 per cent. of its 1896 product is of the Society's sections. However, 39.35 per cent. is of three improved sections, viz.: the Am. Soc. C. E., the Dudley and the Hunt. It is a reasonable presumption that if the demand for rails had been greater in the last three years, and especially if there had been more call for rails for new lines, the progress toward uniform modern sections would have been much greater. But most of the buying has been in small lots for renewals, a condition that has worked to prevent changes of section.

A Crisis with Railroad Employees in England.

The London & North-Western Railway last week reinstated 65 men whom it had discharged because they would not say whether they were members of the Amalgamated Society of Railway Workers, this question being supplemented by a second one: "If so, would you, at the bidding of that society, quit work?" This episode seems to have attracted a great amount of public attention in England, and as matters came to a head on Friday when the London correspondents of the American Sunday papers were preparing their column letters, we get pretty full accounts of the matter by cable. The correspondents

agree in characterizing this victory of trades-unionism as the greatest that has occurred in England. It is indeed in decided contrast to the condition of things in England 70 years ago, when a working man had no rights which his employer was bound to respect. It appears that the members of the Amalgamated Society have long been trying to secure a 10-hour day and other ameliorations of the conditions under which they worked, and after exercising what they believed to be reasonable patience they demanded an answer by Dec. 8. This the London & North-Western directors deemed a threat to strike and sent out their questions accordingly. Of the men who refused to answer some had worked for the road 20 years. The Amalgamated Society at once notified its members to give notice to quit if the discharged men were not reinstated this week. The company declined to reinstate them and declined to treat with the society officers, but the newspapers took up the cause of the men, even the *London Times* telling the directors that they were wrong, and it soon became evident that public opinion was decidedly on the side of the men. The directors then said that they would leave the matter to the Board of Trade, and that body, it appears, decided that the discharged men must be taken back. The "eating of humble pie by the directors of a six hundred million dollar concern" was indeed a sensation, and the affair was the chief topic of discussion.

The despatch of the New York *Evening Post* of Saturday said:

> The trouble arose thus: The union demanded from all the companies a 10-hour day for conductors, signalmen and shunters. A proposal to threaten a strike if the demand should be refused was expressly voted down, yet the North Western alone, assuming that the men intended to coerce the company by a strike at the busiest season of the year, demanded from the men a pledge of disloyalty to the union and dismissed those who refused to make it, with the result that the union issued 50,000 notices [another account says 4,000] to quit the service. The Great Western made similar inquiries, but refrained from dismissals. . . . This victory was won by the pressure of public opinion through the Board of Trade and through leading share holders, among whom are Lord Salisbury, Lord Rosebery, ex-Lord Chancellor Farrer Herschell, Lord Ripon, and Mr. James Bryce, without spending a cent of the $930,000 which the union holds for such fights. Many shareholders even promised to hand over their next dividends to the strike fund. Until yesterday the company persisted in trying to boycott the union. "We claim," the manager said, "to deal with our own servants as we think expedient, without the interference of third parties." But the government having recognized the union as representing the men, the company was bound to do the same thing, though the farce was kept up in Whitehall yesterday, the company's manager going out of one door while the union leader entered another, the President of the Board of Trade acting as go-between.

One despatch says that the brotherhood leaders agree to take no part in the negotiations between the railroad and its employees which are now to follow, but the statement that even when the Board of Trade went through the formality of conciliating the parties to the controversy, the officers of the road strenuously maintained their former independent position, would seem to indicate that the mollifying influences of time are still needed to bring about really peaceful relations.

The principal difference between English and American conditions in matters of this kind probably is to be found in the more thorough and intelligent organization of the brotherhoods in England and the more experienced leadership. In the most important strikes and threats of strikes in this country, it is only by courtesy that the railroads have been able to say that they have found any actual *representatives* to deal with. That is to say, the brotherhood leaders who desired to negotiate presented no evidence as to what, or how many, employees they were acting for. The locomotive engineers have a more effective organization than the other "orders," and in 1888 they made a square fight against the Burlington; and Debs had a loyal following of the lower grades of employees in the West in 1894; but we think that by far the larger part of the men that left their work then, especially those in the higher grades, quit because they were intimidated; though it is true, no doubt, that often a very little intimidation sufficed. But, broadly speaking, American railroad employees follow their leaders in a pretty loose way, if we may judge by the uncertain attitude of the brotherhood leaders when they are challenged to show their authority.

On the bare question of the principle of recognizing a trade-union chief there can be no two opinions. The right to speak through an advocate is too elementary and approves itself too quickly to every one's reason to be called debatable; and if you admit this, how can you prevent two or a hundred employees engaging the same man as advocate? The London & North Western has only done what every large road will have to do sooner or later, if only the employees know enough to secure honest, high-minded and unselfish leaders.

The persistent pressure for shorter hours which the Board of Trade has applied in England for several years past is familiar to the readers of the *Railroad Gazette* from the official investigations of accidents that we have reported. It may not seem exactly right to American legislators, who sit up nights to devise ways to show their affectionate regard for "labor," to see an effete monarchy of the old world doing more effective work in this line than is done here, but such seems to be the case. It is probably true that long hours are more of a burden in England than here, for men on our railroads who work more than 12 hours at a time get, we think, a better measure of extra pay than the Englishmen do; but the Board of Trade's work would not come amiss in this country, in some places.

But whether in England or America, the intervention of a public administrative or investigating board can do good only on the conservative lines already followed; that is, only when it is employed strictly for the good of the public. The Board of Trade, in demanding shorter and more regular hours, has explicitely spoken for the safety of the passengers and others riding on the railroads. If it should attempt to fight the employees' battle for their own individual rights, it would soon get into deep water. For, with all the power of public opinion, whether manifested by Lords and Ministers in England or by the press in this country, it is still as difficult as ever to make changes in *wages* when the law of supply and demand stands in the way. The English railroad men's contest for reasonable hours will probably be won as completely as they can wish; but whether they will secure any permanent increase in their annual incomes is another and more serious question.

Car Ventilation.

The ventilation of passenger cars has been ventilated by means of three hearings before the Massachusetts State Railroad Commissioners at Boston, but, so far as we can gather from the reports in the daily papers, the result of the hearings, as regards the amount of new and useful knowledge evolved, is precisely the same as that of all other inquiries on the subject during the past dozen years—*nil*. The ideal ventilation is cumbersome and costly. The best practicable ventilation depends upon the care of intelligent attendants more than anything else, and the most intelligent attendants that we find in real life fail of the best results largely through the ignorance or obstinacy of passengers. The lazy brakeman justifies his laziness on the ground that by letting individual passengers have their own way he reduces criticism to the minimum and saves the company's coal. The brakeman ambitious to give the best service gives up in despair.

We may note in passing that amid the disheartening effects of the degenerating tendencies of modern legislatures—a blight which has appeared in Massachusetts as well as in the newer states—that state is to be congratulated on still retaining enough sense to hand over at least some of its tough and doubtful problems to commissions, instead of passing crude laws on the spur of the moment. This question of ventilation came before the legislature last year, but that body, following a well-settled rule of procrastination that seems to work much good "referred the subject to the next General Court," and instructed the Railroad Commissioners to meanwhile investigate it. We do not know how faithfully the Boston reporters tried to select the most instructive portions of the proceedings before the Commissioners, but the most prominent points that we note are two fallacious arguments offered in defense of the present practice on railroads.

The first argument was that all *specific* complaints of bad ventilation come from patentees of ventilating devices. A railroad officer, testifying before the Commission, forgot to mention this in his defense and another railroad man present prompted him to include it. It seems to us that he did not thereby strengthen the case. Certainly there are plenty of passengers who desire to have cars better ventilated; and in view of the fact that railroad officers have been for years telling them that everything reasonably practicable was being done for the improvement of present conditions, it is not surprising that they do not complain. It may fairly be assumed that they recognize the difficult nature of the problem and are patiently waiting for further improvement. It is not fair to assume, as seems to have been done by these Boston railroad men, that because these reasonable people keep silent, everybody except the inventors is satisfied with conditions as they are.

Car ventilation is peculiarly a matter in which the party or person responsible must pursue an independent course. If the criticisms of passengers are asked there may be forty different opinions in each car, one to each window. If the ideal is unattainable, the best possible compromise must be made the standard for practice; and to do this it may be necessary to fasten all the windows down, thus absolutely denying to all passengers the privilege of advising as to when and to what extent minor changes in the quantity of fresh air shall be made when the train is in motion. This will certainly be necessary if we ever attempt scientific ventilation in mild or hot weather. And in winter the openings in the doors of passenger cars are subject to the same interference from passengers that windows are in summer. If we are ever to have wise ventilation in the common day car, some one wise person must have absolute control of the openings; and to do this all openings must be out of passengers' reach.

We do not blame the passengers. Delicate women and children, as sensitive as hot-house plants, are bound to travel, and in winter as well as summer. When one of these sits in the front seat she has a right to complain if the sash in the door is wide open on a cold day; and yet at the same time it may be that nothing less than the entire opening is sufficient to supply the air needed by passengers in the middle of the car. We do not suggest that this sash be put under lock and key, and the woman made to put up with the cold draft. We do not suppose that we know how to meet the difficulty any better than do the master car builders who read this paragraph. But this is one of the every-day facts that should keep us from forgetting that our ventilating devices are still far from satisfactory.

The other statement offered as an argument was by a representative of the West End Street railroad, who said that the ventilation of the street cars of Massachusetts is better than that of the rooms in the State House. As the State House, with its gorgeous gilded dome, is the chief material glory of Massachusetts, this remark must have cut to the quick the pride of the Railroad Commissioners, if, as representatives of the state, they are as jealous of the reputations of the other officials as they naturally must be of their own; but we are unable to see how it affects the question at issue. The legislative halls are probably filled with tobacco smoke most of the time, and, if we may judge by the cost of the cigars which the members smoke at the state's expense whenever they can get on a committee which is authorized to incur "traveling expenses," it would be wrong to ventilate such rooms. Such smoke is too costly to be blown out of the window. Again, any citizen can evade service in the legislature if his conscience is not severely patriotic, and he need not breathe State House air. But those who reside in the suburbs of Boston find 15 to 30 minutes' residence in a street car every morning a necessity. It is a part of the process of earning their daily bread.

The question of ventilating street cars is quite easy, theoretically, but the cost is high. The present inquiry was set on foot, we believe, more by street-car passengers than by those who ride on standard railroads. The great majority of street-car passengers spend so short a period in the cars at any one time that they will put up with foul air with more docility than when on a two-hour journey. The fact that half of them are standing and all have on their overcoats also makes them less critical; and if the heating problem is settled the ventilation is not likely to be very troublesome.

Of course the settlement of the heating problem means raising the temperature of the car to a reasonable degree with the ventilators *open*. As an electric heater in a car requires probably half as much power as the motor, on the average, the expense is no small item, and it is not to be wondered at that the West End, or any other company operating in a cold climate, seeks to keep the temperature in its cars as low as passengers will put up with. But that street cars must be heated in some way is no longer a question; and, as in the case of steam cars, the exercise of good judgment by the custodian of the car will make the conditions tolerable, even with imperfect appliances. If a street railroad expects to carry people on 30-minute, or even 20-minute, journeys, it will in the long run be compelled to warm its cars to retain the passengers' patronage; and the public will rapidly gain the intelligence to demand warmed cars, even on shorter journeys. We know of a street road which warms some of its cars (if we may judge by the intolerable odor in them on cold days) by the process reported to have been employed once by a Russian government official when he was short of fuel; he packed the room full of Cossacks and kept them there long enough to raise the temperature of the walls and the atmosphere by animal heat. That policy on street cars, where Dagoes abound, is the most barbarous that we can imagine. On the other hand, for an example of very economical heating, where the ventilators are kept open, and yet where every advantage

is taken of the passengers' overcoats and of the mildness of their criticisms, due to the shortness of their journeys, we can point to a certain elevated road not far from New York.

The Senate of the United States, on motion of Mr. Chandler, of New Hampshire, has directed the Committee on Interstate Commerce to inquire whether the railroads in the Joint Traffic Association have agreed to obey the Board of Managers; whether such obedience is contrary to the anti-pooling law, and whether the Government is "sufficiently represented by adequate counsel" in the pending litigation upon this subject. As our readers are well acquainted with the industrious and erratic Chandler it is scarcely necessary to comment on this resolution. We may note in passing, however, as another little illustration of the useful character of the public service rendered by this Senator, that he told a reporter the other night that he was ready both to pass a resolution declaring the independence of Cuba and to vote to declare war against Spain. As incident to his inquiry about the Joint Traffic Association, he probably found it impossible to cite any legal authority for such action, except "incidentally"—he asks the committee to ascertain if the flour millers and the window glass manufacturers have made any combination to raise or maintain prices. As the traffic questions referred to have been very thoroughly argued in the United States Circuit Court and the arguments published; and as the decision in the case has been referred to the Supreme Court of the United States on appeal, it is perhaps charitable to assume that the flour and the glass men are the principal game aimed at. Otherwise it is hard to discover on what grounds the supposedly level-headed members of the Senate humored Chandler by voting for his resolution.

The dealers in apples at St. Louis complain that through rates from the East to Mexico, which have been reduced to meet water competition, have entirely destroyed the jobbing trade in apples at St. Louis; and as Texas and the Southwest are "naturally tributary to St. Louis," these merchants are casting about to find somebody to whom their complaint can be addressed. Without entering into a very detailed study of the situation, we should say that the Texas retail apple market is "naturally tributary" to the orchards where the apples grow, and that if the jobbers of St. Louis cannot get the buyers to pay them for taking the apples out of the cars there and sampling them, they had better turn their attention to something more profitable than whining. A barrel of York-state or Michigan apples with the head out does impart a delightful aroma to a store—it should stand near the office—but it seems to us that the Texas consumer is entitled to just as large a percentage of this aroma as can possibly be conveyed to him from the place where the apples are first packed. If the farmer can rush them through to him direct he may be able to deliver 100 per cent., and thus perhaps improve the Texan's health by leading him to drink less cider.

According to a St. Paul paper the Chicago, Milwaukee & St. Paul Railway in carrying passengers from Sioux City, Ia., to Akron, in the same state, has to carry them a part of the way through South Dakota, and on the strength of this constructive freedom from the restraints of Iowa law, charges them four cents a mile, which is one cent. higher than the state of Iowa authorizes; and some of the people are making complaint about it, threatening to appeal to the Railroad Commissioners. As railroads carrying freight from one point to another in the same state, over a line passing through another state, have been allowed to ignore the Interstate Commerce Law on the ground, sustained by the Supreme Court of the United States, that such commerce is not interstate, it would look as though the Milwaukee road in this case would have to come down. This traffic either is interstate, or is not. If it is not it must be Iowa traffic. If it is interstate, why, Sioux City has an Interstate Commerce Commissioner of her own, and she certainly will not have to suffer for lack of justice.

NEW PUBLICATIONS.

Railroad Transportation Taxation is treated from an economic standpoint by Sigmund Sonnenschein, an official in the Austrian Railroad Ministry, in an octavo pamphlet of 107 pages, which describes the legislation of the chief European countries on the subject, with a sketch of the history of their practice, and some discussion of the policies practiced and proposed. ("Die Eisenbahn Transportsteuer und ihre Stellung im Staatshaushalte." Berlin: Julius Springer.) In his discussions, naturally much attention is given to state railroads, which now prevail east of France and north of the Alps. One might suppose that the taxation of transportation on state railroads would be an absurdity, because what income the state may require from this source should be best and most simply secured by adjusting the rates; but our author thinks that it will be best to tax them. A difficulty which was foreseen when the state purchase was decided in Prussia in 1879 has proved a real and serious one. In prosperous times a great state system may produce a very large surplus, which if used for general state purposes either encourages lavish expenditures, or leads to the neglect of other sources of national income. Then when hard times come, the railroad surplus is sure to be greatly reduced or entirely destroyed, and the state has to seek new sources of income just when it is hardest to find them. This, however, is but one phase of a universal phenomenon; when the people have reduced incomes, it is extremely difficult, and often impossible, for any one industry, business, organization, or that sum of all of them which we call the state, to secure its old rate of income and maintain its old scale of expenditure.

Mr. Sonnenschein's pamphlet is largely taken up with a transcript of the laws of different countries on railroad transportation taxation (not the taxation of *railroads*, but of the traffic passing over them). The legislation of France, England, Italy, Russia, Hungary, Austria and Germany is so given. The taxes imposed are large stamps on way bills, tickets, etc.

Since this book was published, announcement is made of a local transportation tax in Russia, which will be novel to most of us. An imperial ukase authorizes the town of Ufa a considerable town near the Ural Mountains, on the railroad which leads to the Siberian Railroad, to levy a tax of from $\frac{1}{80}$ to 1 kopek per pood—that is 0.0125 to 0.75 cent on every 36 lbs.—$\frac{5}{8}$ cent to 41¼ cents per ton—on all freight, except fuel, timber, etc, received and shipped at the railroad station there and at the landings on two rivers in the town, for the term of 10 years, the proceeds of which tax shall be applied to the improvement of the roads leading from the city to the station and to the landings.

TRADE CATALOGUES.

The Painting of Metallic Surfaces is the subject of a pamphlet issued by Messrs. Harrison Bros. & Co., Philadelphia. Nearly all the pages of this small sheet are filled with considerations of the properties desirable in a paint for use in the protection of metals, and of properties that are to be avoided if possible. The last few pages, only contain the claims made for Antoxide or Harrisons' Anti-Rust. Some of the special applications of the article are mentioned such as on boiler fronts, smoke-stacks, roofs and roof-trusses etc., the preparation being primarily intended for the preservation of structural iron work. Antoxide, or Anti-rust, is especially recommended to be used over a priming coat of red lead, though the lead is by no means necessary. In regard to the use of red lead as a priming coat and the protection of iron in general Messrs. Harrison Bros. & Co. also issue another pamphlet, uniform in size with the one mentioned, called "Paint as a Protection for Iron," which is reprinted from the proceedings of the Engineers' Club of Philadelphia. This will be of interest to paint-users. This sheet states that a dry film of red lead and linseed oil is porous, and in that very point it fails in one of the most important essentials of a proper coating for iron, unless this defect be remedied by a second coating of paint, which will dry with an absolutely impervious and waterproof surface.

Compressed Air, Tools and Appliances is the subject of a 20-page pamphlet 8 × 11 in. recently issued by the Clayton Air Compressor Works, 26 Cortlandt street, New York. The opening paragraph calls attention to the rapidly widening field of usefulness of compressed air. After the illustration of each of the pneumatic tools there is given a short description of its design and application. The latest tools used in railroad repair shops are described at some length. This includes the Boyer pneumatic hammer, Manning piston air drill, Manning sand-paper machine, pneumatic rivet holder-on and the pneumatic car-seat cleaner, all of which were illustrated and described in the *Railroad Gazette*, Oct. 2, 1896. Beside these, the pamphlet contains a description of the Keller pneumatic tool for delicate carving work on marble, the Phœnix portable rotary drill and the Brest drill, the Pittsburgh bridge riveter, strait-lift air hoists, pneumatic sand sifter and air compressors.

The Lunkenheimer Company, of Cincinnati, O., with branch offices in New York and London, has issued its 1896 illustrated catalogue and price list of brass and iron valves, cocks, oil cups and other steam fittings and specialties. The catalogue is a pamphlet, 5¾ in × 4 in., contains 118 pages, and is fully illustrated. The company makes a feature of special work for engine and machinery builders, and is prepared to furnish estimates, on receipt of specifications, and to make brass, gun metal, phosphor bronze and anti-acid castings.

Big Cars Again.

At the November meeting of the Central Railway Club Mr. H. H. Perkins read a paper on the question "Shall the Cubic Capacity of Ordinary Box Cars be Increased; if so, What Shall Be the Maximum Limit?" Among other things he said:

"Years ago, in conversation with a then division Superintendent, afterwards a railroad manager of distinction, I remarked we would see cars carrying 1,000 bu. of grain from Chicago to New York; he replied: 'Never, as the tendency would be to reduce the size of loads rather than to increase them.' We have both seen more than was predicted.

"The country is growing, and business is not only keen among manufacturers, but also between railroads; and, unless the railroads can agree among themselves to limit the size of cars, the 60-ft. car is bound to come. It is here for empty barrels, next empty boxes and baskets, carriages, furniture, hay and agricultural implements; if they hold off, one railroad against another will get them, and shortly other commodities will demand them.

"The question placed before the committee was, what will be the maximum size of box freight cars? It is limited now on Eastern roads by the height of their bridges, or size of their tunnels, but on the prairie roads, apparently, by the sky and the horizon. Will it remain 40 ft. long, 15 ft from top of rail, 10 ft. wide, 30-ton capacity, which is now about the practical maximum; or will it, in a few years, evolve to 60 ft. long, 20 ft. high and more than 10 ft. wide?

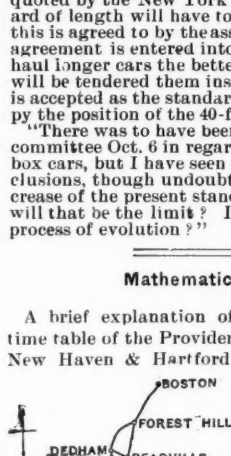
Some may claim these latter figures are impossible, but they are no greater than the present maximum appeared when railroads were first projected; and, although size of tunnels and height of bridges limit the maximum now, is their any limit to which changes in these can be made? Is the maximum always to be limited by the present tunnels and bridges, or will the Eastern roads have to increase the size of tunnels and bridges in order to haul what the Western roads can furnish patrons? It strikes me that the question whether large cars pay the roads has never been fairly considered; the subject only being looked at, as what has the other fellow done; what he has done, we can do; therefore, if one road builds cars 60 ft. long, 50-ton capacity, straightway another follows suit, even if bridges and tunnels have to be enlarged to do it. There is no limit to what a road-bed can be made to bear. Is not the 50-ton car a probability, and the 100-ton car a possibility? Would it not be better for the associate roads to agree on a maximum size and refuse to handle or haul beyond that limit? Then the plant of railroads can gradually be made to conform to that standard.

"Apparently, the consensus of opinion, among those quoted by the New York committee, is that the standard of length will have to be increased to 40 ft., and if this is agreed to by the associate roads, the quicker some agreement is entered into by all roads not to receive or haul longer cars the better; otherwise the 50 or 60-ft. car will be tendered them inside of a year after the 40-ft. car is accepted as the standard; and, thereafter, it will occupy the position of the 40-ft. at present.

"There was to have been a meeting of the New York committee Oct. 6 in regard to limiting size of freight box cars, but I have seen as yet no report of their conclusions, though undoubtedly it will recommend the increase of the present standard to 40 ft. in length. But will that be the limit? Is not the 60-ft 100-ton car in process of evolution?"

Mathematical Time-Tables.

A brief explanation of certain features of the spring time table of the Providence Division of the New York, New Haven & Hartford (Boston to Providence and branches) appeared in the *Railroad Gazette* of June 12, page 416. The summer time-table embodies extensive additions to the scheme then outlined, and certain innovations in the construction of train schedules, most of them exceedingly well conceived and all of them worked out with great ingenuity. This time-table, in fact, differs widely from all previous time-tables of this road and is giving, on the whole, so great satisfaction that a somewhat detailed account of it will be found interesting.



The main line of the Providence Division has had for many years three tracks from Boston to Readville, 9 miles. In 1895 the construction of a fourth track began in connection with the expensive project for the raising of the grade of the road above all intersecting streets for about 4 miles from Chickering, 1 mile from the Boston station, nearly to Mount Hope, between 5 and 6 miles out. In order to accommodate the heavy traffic to two tracks instead of three while this work should be going on, a new schedule was found necessary, and what General Superintendent E. G. Allen very properly calls a "mathematical time-table" was adopted to cover the suburban service. This proved so convenient that a similar scheme was proposed this summer for the whole of the Old Colony System.

For a perfect understanding of the scheme the components of the Providence Division should be borne in mind. The main line extends from Boston to Providence, 44 miles, and numerous through trains continue on to New London, New Haven and New York. The first branch leaves the main line for Dedham and more distant points at Forest Hills, 5 miles from Boston. From Readville, 9 miles out, another branch goes to Dedham. At Canton Junction, 15 miles from Boston, a branch diverges for Stoughton and points beyond, and from Mansfield, 25 miles from Boston, an intersecting line (which for the present purpose may also be considered as a branch) leads to Taunton, thence continuing by one fork to Fall River and Newport, and by another to New Bedford.

Considering now only the movement of trains from Boston, the problem involved in the construction of a "mathematical time-table" was not only to have trains leave the Park Square station for certain places on the main line at regular intervals, but also to have them make close connections for the branches; to have the travel between intermediate points duly accommodated, as well as that from the city to the country; and to have accommodation trains connect conveniently with express trains.

The first element in the combination is a series of trains from Boston to Forest Hills and way stations, leaving Park Square every half hour, at 6:07, 6:37, 7:07, etc., during the day until 8:07 p. m., and then hourly at 9:07, 10:07, and 11:07, with intermediate trains at 6:52, 7:22 and 7:52 a. m., and 5:22, 5:52 and 6:22 p. m., making 15-minute departures during the early morning and early evening. The running time from Boston to Forest Hills is uniformly 14 minutes, so that every way station has, like Boston, a regular hourly, half-hourly or quar-

ter-hourly departure, and Forest Hills a similarly regular arrival. The only considerable objection to this system arose at the important station of Jamaica Plain, 3½ miles from Park Square, which formerly had numerous express trains, but under the new arrangement has none at all. The present time table gives Jamaica Plain 38 daily trains. An electric line runs from the city on either side of the railroad.

Regarding still the main line, the next factor is a series of trains from Boston to Mansfield, leaving Park Square at 18 minutes past the hour, running express to Forest Hills, taking on there passengers for more distant points picked up at the intermediate stations by the preceding Forest Hills local, and then stopping at all stations between Forest Hills and Mansfield. These Mansfield trains leave Boston at 6:18, 8:18 and 10:18 a. m., and 12:18, 2:18, 3:18, 4:18, 5:18, 6:18, 7:18, 9:18 and 11:18 p. m —every two hours morning and night, hourly during the afternoon.

Next in order comes a series of local expresses from Boston to Providence, leaving Boston uniformly at 45 minutes past the hour and arriving in Providence at 58 minutes past the hour; making the run of 44 miles, with four stops, in 1 hour and 13 minutes These trains make no stop between Boston and Mansfield, and at Mansfield take passengers brought by the trains of the preceding series, from stations between Forest Hills and Mansfield. for West Mansfield, Attleboro, Pawtucket and Providence. (There are additional accommodation trains from Attleboro to Providence) The trains of the 45-minute series leave Boston at 6:45, 8:45 and 10:45 a. m., and 12:45, 2:45. 3:45, 4:45, 5:45 and 6:45 p. m. The one last named is the Providence Line (steamboat) train, and runs to Fox Point wharf instead of the Union Station. In the absence of necessity for express trains from Boston at 8:45 and 10:45 p m., the Mansfield trains at 9:18 and 11:18 p. m. run through to Providence.

A fourth series of trains completes the main-line service. This consists of the long-established and familiar Shore Line expresses between Boston and New London, New Haven and New York. The adjustment of the entire system, in fact, was based on these trains, in which changes were neither desirable nor practicable. The Shore Line trains leave Boston at 9 (Colonial Express), 10 and 10:03 a m., 1:03, 3, 5 and 7 (Federal Express) p. m., 12 and 12:03 midnight. The trains of the series next preceding arrive in Providence just ahead of these Shore Line trains, which thus round out the scheme of successive connections from way stations as outlined above. The arrangement, as will be readily seen, is such that a person in Jamaica Plain, for example, wishing to go to New London can leave home, we will say at 2:19, on the Forest Hills accommodation, change at Forest Hills to the Mansfield accommodation at 2:28, change again at Mansfield to the Providence Express at 3:23, and finally at Providence take the Shore Line Express at 4:01. Similarly every station between Boston and Providence is given good connections for every other intermediate station, and also for Providence and points beyond, while the New York trains are permitted to make a quick run without a stop from Boston to Providence, the standard uniform time for the 44 miles being one hour and one minute

The Mansfield trains at 18 minutes past the hour leave Boston during the greater part of the day every two hours: at the same minute on the intermediate hours a series of trains is scheduled for Dedham, via Readville, the mathematical precision of the previous arrangement between Boston and Forest Hills and Readville being maintained. The Mansfield local trains connect at Canton Junction for the Stoughton branch invariably, with one exception, a special express leaving Boston for the branch at 5:33 p. m., instead of the 5:18 connection. In like manner most of the trains leaving Boston at 18 and 45 minutes past the hour connect at Mansfield for Taunton.

One other combination of trains completes the list—a series leaving Boston for the Dedham branch, via Forest Hills, at 6:20, 7:20, etc., hourly until 4:20 p. m., then half-hourly until 7:20, then hourly again until 11:20 p m. For some reason one irregular train is interjected, at 7:37 p. m., while one at 6:05 p. m. makes a 15 minute interval at the height of the evening travel.

For a single tabular illustration of the convenience of the system, so far as the aid to memory afforded by uniformity is concerned, the following exhibit of the trains from Boston to Taunton is presented:

Boston, 6:18, 6:45, 8:18 8:45, 10.18, 12:45, 3:18 3:45, 4:18, 4:45, 5:18, 5:45. 6:18, 6:45.
Mansfield, 7:15, 7:24, 9:15, 9:24, 1:15, 1:24 4:15, 4:24, 5:15, 5:24, 6:15. 6:24, 7:15, 7.24.
Taunton, 7:33, 7:38, 9:33, 9:38, 1:33, 1:38, 4 33, 4:38, 5:33, 5:38, 6:33, 6:38, 7:33, 7:38.

The arrangement of trains to Boston is similar to that of the outward trains, the hours of departure from initial points, of passing intermediate points, and of arrival at Boston, being regulated with the same mathematical precision. From Providence to Boston, for example, the local expresses in a regular series start at two minutes past the hour, include the stops to Mansfield and thence run express, making the trip through from Providence, the same as in the other direction, in 1 hour and 13 minutes, and arriving in Boston uniformly at 15 minutes past the following hour. From Mansfield each of the expresses is followed by a train that runs accommodation to Forest Hills and thence express, and these Mansfield trains in turn are followed by way trains from Forest Hills to Boston. The trains of both series leaving Mansfield have connections from Taunton and points beyond.

The same plan is carried out in the arrangement of the service in both directions between the Kneeland street station, Boston, and all points on the complicated network of main line and branches that make up the Plymouth, Taunton and Cape Cod divisions. Some variations have been found necessary, but they are few in comparison with the very great number of trains whose schedules are fixed with absolute regularity on the mathematical basis of uniformity in speed and hours of departure and arrival.

These time-tables have been in force since June 14, and the New Haven officials say without qualification that they are proving very satisfactory both to the public and the company. For commuters and suburbanites in general the convenience of uniform hours of departure in both directions throughout the day is very great. The tax upon the memory and the chances of getting left could hardly be made less than by this system, in which the variations from regularity are exceedingly few. From the railroad point of view the advantages of the scheme are that it is easier than formerly for the trainmen to become familiar with and to remember the time-table; that the movement of trains can be made with much less confusion and much more like clock-work; and, above all, that a service in the main satisfactory to the community can be performed with a smaller amount of train mileage than under the old system, or lack of system, under which trains were run with no attempt at regularity.

TECHNICAL

Manufacturing and Business.

The International Automatic Air-Brake Coupler Co., formed about a year ago, elected new officers as follows last week at St. Louis: Mr. J. C. Van Blarcom, Cashier of the National Bank of Commerce, was elected President; Mr. S. M. Dodd, President of the Missouri Electric Light & Power Co, was elected Treasurer, and Mr. E. L. Drake, Secretary.

The Berlin Iron Bridge Co. has received the contract for the galvanizing room for the Rhode Island Tool Co., of Providence, R I. The building will be a fireproof construction throughout.

J. B. Kendall and William S Hodges have incorporated the Swan Manufacturing Co. at St. Louis, Mo., with a cepital stock of $20,000, to manufacture railroad appliances.

The Chicago Pneumatic Hammer Co., of Chicago, has just received a cable order from London, Eng., for 10 additional hammers.

The plant of the Litchfield (Ill.) Car & Machine Co. was sold recently by Master in Chancery Howett for $50,000. The purchasers were M. M. Martin & Co., Litchfield Ill., and the Mechanics Bank, of St. Louis.

The works of the St. Joseph (Mo.) Bar & Axle Co, will not be opened until after the organization of a new company, owing to the death of President D. McDonald, of the present company.

Iron and Steel.

The old rolling mill of the Lackawanna Iron & Steel Co., Scranton, Pa., which has been idle for several months, has started up for an indefinite run, giving employment to 175 men.

The Wheatland Rolling Mill, at Sharon, Pa., will resume operations, after an idleness of over 15 years, by the settlement of the Wood estate. Thomas Wood assumes control of the mill and will put in $50,000 worth of machinery for the manufacture of street car rails. About 500 men will be employed.

Mattie furnace, of the Girard Iron Co., Girard, O., has been blown in after an idleness of several months. The furnace has been extensively repaired and improved, three new Foote ovens having been added and other additions to its equipment made. The furnace has capacity of about 360 tons per day.

In the Circuit Court of Douglas County, Wis., on Dec. 10, the Central Trust Co., of New York foreclosed a mortgage for $1,600,000 upon the steel plant of the West Superior Iron & Steel Co. The case has been on in the courts for several years.

New Stations and Shops.

The three railroads passing through Denmark, S C., the Atlantic Coast line, the Georgia and the South Carolina & Georgia have agreed to build a first-class union passenger and freight station.

Four six-story warehouses, two of them 64 ft. × 204 ft.- are to be built by the Baltimore & Ohio road in Baltimore.

Meeting of the Bessemer steel Association.

A meeting of the American Bessemer Steel Association was held in Pittsburgh, on Dec 9, 10 and 11. After the last session of the meeting the following statement was issued by Secretary Griscom: "Owing to the condition of the iron and steel business at present, no fixed price has been arranged by the association for billets, slabs and sheet bars covered by the association. However, the association continues intact, and the adjournment was taken with a harmonious feeling existing among the members."

The most persistent dissatisfied firm was the Bellaire (Ohio) Steel Company. It is represented that the company has a large stock of Bessemer ore, which had been purchased at a low price, and it felt that it could get along outside the pool.

The Right to Make Pressed Steel Parts of Trucks.

A decision was rendered in the United States District Court, Pittsburgh, Dec. 8, 1896, in the case in equity of the Fox Solid Pressed Steel Co. against Charles T. Schoen and the Schoen Manufacturing Co. The decision is written by Judge Atcheson. The Fox Company sued for an injunction to prevent the Schoen Company from making pressed steel parts for car trucks. The suit was dismissed with cost to the plaintiffs. Prior to Oct 10, 1891, both the parties were making center plates of pressed steel, under patents owned by them respectively. On that date they made a contract under which the Fox Company granted to the Schoen Company the right to make center plates under the Fox patents, the defendants agreeing to pay 7½ per cent. of the gross selling price of such plates, and it being stipulated that the Fox Company should have the right to make center plates for use on the pressed steel truck frames, manufactured by it on payment of a royalty, but should not otherwise engage in the manufacture of center plates. The contract contained this provision: "It is further agreed, that the parties of the second part will not engage during the life of this agreement in the manufacture of truck frames for moving vehicles, or any part of such frames when made of pressed metal." The controversy grew out of the interpretation of this clause. The plaintiff contended that the clause prohibited the defendant from making any part of any truck frame out of pressed metal. The defendant maintained that the prohibition is only against making pressed metal truck frames and parts of pressed metal truck frames. In the opinion of the Court, considering all the conditions under which the contract was made and its terms, this clause was intended simply to secure to the plaintiff freedom from competition in the manufacture of pressed metal truck frames and parts thereof; that it had no further intention. Furthermore, at the time the contract was made the defendants were making pressed metal parts for diamond truck frames and continued to make them with the knowledge of the plaintiff's principal officers and without objection. This was continued and acquiesced in until about the time of the filing of the bill, namely, April, 1895. The occasion for the filing of this bill was that in February, 1895, the defendants began to make a pressed steel truck bolster. The Court holds that the bolster is no part of a truck frame, and, moreover, that no truck bolster is used with pressed metal truck frame, and the Court is unable to see how the plaintiff can justly claim that the manufacture of the bolster is within the prohibitory clause of the contract. But finally, if as the plaintiff contends, the clause really interdicts the defendants from the manufacture from pressed metal of any part of a diamond truck frame, then it is in unreasonable restraint of trade and not enforcible. Therefore a decree is ordered dismissing the bill with costs.

Pig-Iron Production Increased.

A considerable increase in pig-iron production in the United States took place during November. The total number of furnaces in blast has been increased from 133 on Nov. 1, to 147 on Dec. 1, and the total capacity per week of these furnaces in gross tons has increased during this time from 124,077 to 142,278 This increase in pig iron, although perhaps not as great as was generally expected, is still very marked over that of September and October. Some of the more important furnaces which were blown in during November are: The new Niagara at Tonawanda, one Crane in the Lehigh Valley, one Edgar Thomson and Clinton at Pittsburgh, four in the Shenango Valley, and three in the Mahoning Valley. The Illinois Steel Co. stopped one furnace at the new South Chicago plant, and two at the old South Chicago works. The following table has been compiled from figures taken from the *Iron Age*, and shows the general location and condition of all the furnaces in the country on Dec. 1:

Location of furnaces.	Total No. of stacks	No. in blast.	Capacity per week — tons.	No. out of blast.	Capacity per week — tons.
Pennsylvania...	186	66	75,057	120	75,167
Ohio.....	55	21	18,199	34	18,303
The South	117	39	30,528	78	35.775
Other Districts.	106	21	18,494	85	40,660
Total.....	464	147	142,278	317	169,905

Electric Motors for Drawbridges in Chicago.

The drawbridges over the Chicago River, which are now operated by steam are to be changed and worked by electricity in the near future. This necessitates installing electric machinery at the following bridges: Twelfth street, Taylor street, Polk street, Harrison street, Jackson street, Adams street, Madison street, Washington. street, Randolph street, Clark street, Dearborn street, State and Rush streets. The bridges at Van Buren street, Lake street and Wells street are now worked by electricity. The street railroad companies will bear the expense of making the change at such bridges as are used by their cars.

Electricity in the New Union Station, Boston.

The plans of the Boston Terminal Company, which have been in preparation, are now said to be completed and will shortly be submitted to the Mayor for his approval. They have not yet been made public, but it is believed that large provision has been made for electricity as a motive power. The mechanical success of the Nantasket branch of the New York, New Haven & Hartford

will, in the opinion of the officers of that system, pave the way for an ultimate, and perhaps not far-distant, similar change of motive power for all it suburban traffic. The New England and the Old Colony systems, being under the same management, will, in such case, follow suit. There will be a special section of the new station devoted to the handling of electric trains, and provision will be made for its ultimate extension throughout the station.

THE SCRAP HEAP.

Notes.

George W. Johnson and another, lately convicted of train wrecking in Michigan in 1894, have just been sentenced to imprisonment for 20 months each and fines of $2,500 each.

On the Cumberland Valley Railroad a number is now painted on each wheel of every passenger car, thus facilitating records and communications about repairs. This road designates localities on its line by numbers on the telegraph poles, a number to every fourth pole.

The tramp nuisance on the Pennsylvania Railroad in New Jersey seems to be as serious as ever, although the road some months ago arrested a large number. Recently the detectives have started another campaign, and arrests by the dozen were reported at points between Jersey City and Trenton on four successive days, Dec. 9, 10, 11 and 12. On the 9th 28 tramps were arrested and jailed near Perryville, Md.

The Seaboard Air Line is to establish 100 small experimental farms along the line of its road, the aim being to give the resident farmers object lessons in the diversification of crops.

The Burlington & Missouri River is to establish a number of experimental farms in Kansas and Nebraska, the object being, as we gather from a press dispatch, to make careful experiments in plowing the ground and cultivating the crops so as to prevent the too rapid evaporation of moisture in dry weather.

Another Grain Elevator at Galveston.

A contract was awarded last week by the Galveston Wharf Co. to James Stewart & Co., of St. Louis, to erect a 750,000 bushel elevator on the wharf front, at a cost of $200,000. Work will be begun at once and the elevator pushed to an early completion. The erection of this building will increase the elevator capacity here to 2,150,000 bushels.

Trial of an Electric Brake.

The Consolidated Traction Co., of Jersey City, has been experimenting for about three weeks with one of the electric brakes made by the General Electric Co. The brake is applied by moving the handle of the controller around on the quadrant beyond the point to the left where the current is shut off. This movement makes the necessary connections which change the motor into a dynamo, driven by the stored energy of the moving car; and the current which is thus generated is employed in the electric brake apparatus. Thus far the trials have been most satisfactory, it being possible to bring the car under immediate control by a simple wrist movement of the motorman.

New York & Brooklyn Bridge Traffic.

The annual report of the Trustees of the New York & Brooklyn Bridge, issued this week shows receipts from tolls during the year, $1,201,758, divided as follows: Carriageways, $88,800; railroad, $1,112,957. During the 12 months the number of passengers carried on the railroad was 43,996,459. The number carried in the previous year was 44,564,329, giving a revenue of $1,130,608. Receipts from all sources were $1,712,061. The expenditures were $1,640,490, leaving a balance of $71,570. In the ten years that the railroad has been in service, 435,150,309 passengers have been carried, and only two of these were killed.

Burnt-Clay Ballast.

The Missouri, Kansas & Texas has been using burnt-clay ballast on certain portions of its line in the Indian Territory, and the success has been great enough to warrant its use on other portions of the line. Kilns are now being erected at Hillsborough, Tex., to burn the clay for ballasting portions of the Texas lines.

Sales of Kansas Lands.

The Union Pacific Railroad Company has just sold to two men in Kansas City 50 sections of land in a good farming section in central Kansas. This tract contains 32,000 acres, and the consideration is stated to be close to $300,000. The Land Commissioner of the railroad is quoted by the Omaha *Bee* as saying that there is a considerable increase in the demand for Western lands; the company is selling a good deal of grazing land in Colorado. Its land sales have increased perceptibly since the election. Most of the money comes from the East; "there appears to be renewed confidence there in the future of the West." The same paper printed an interview with D. C. Stapleton, land agent and immigration promoter, who has just returned from London, where he spends a good deal of his time. He told the *Bee* that he found the interest of English capitalists in Western investments at high water mark, and had hopes of investing a considerable English capital in Nebraska during the coming year.—*Journal of Commerce.*

"No Cars on this Railroad."

In the forest of the Bridal Veil Lumbering Co., at Bridal Veil, Or., not far from The Dalles, there is a railroad which does business without cars. An article in the *Northwestern Lumberman*, describing the work of this company, has a picture of a "train" on the road, which consists of an ordinary locomotive, such as are common on logging roads, and a string of logs, each log being as large in diameter as the boiler of the engine, or larger. Boards are nailed to the sleepers between the rails and on these the logs slide. Except on descending grades, the boards are greased, and the train moves at good speed. Where the road is level or slightly ascending the engine pulls the logs, and where it is descending it holds them back. At the mills of this company the manufactured lumber, regardless of size, is run into a flume and this is carried about two miles to the planing milland shipping yard, the flume descending in that distanceabout 1,200 ft.

One Step Toward Economy.

At the November meeting of the St. Louis Railway Club the following letter was read, received with applause and made a part of the official record. It is from Mr. Eugene McAuliffe, Locomotive Engineer of the Kansas City, Fort Scott & Memphis Railroad Company:

"By copy of 'Official Proceedings' of club meeting, held Oct. 9, I note with interest the reading of Mr. G. S. McKee's paper, captioned 'Locomotive Supplies.' That this is an excellent paper, and one that will command lengthy discussion at the next meeting, there can be no doubt.

"The last paragraph on page 12 reads: 'In regard to other supplies which are furnished for use on our engines, such as oil cans, brooms, scoops, padlocks, etc., no one will venture to say that their method of handling these supplies will prevent more or less waste. I think I am safe in making the assertion that no company receives a benefit of more than 50 per cent. of the possible service from supplies of this kind.' As an 'employee, I beg to call the attention of the club to the fact that at least a part of this extravagance is caused by the reason that no attempt is made to acquaint enginemen with the cost of these articles. Take bursted air-hose, for instance. Very few men know that they cost in the neighborhood of $4, and that the hose can be replaced for $1, making the whole affair as good as new. There are thousands of defective hose strewn along the roads of this company that are to the men, cast iron, but worth to the railway company $3. Again, in cold weather it is almost absolutely necessary to thin engine oil with something of less body; some men use headlight oil that costs 11 cents, while others use signal oil that costs 36 cents, to the same end. Thousands of gallons signal oil will be used this coming winter for this purpose, when headlight, at less than one-third the cost, would do as well.

"It is unfortunate that railway companies are compelled to educate their men, but that is a condition that must be faced, looking for reward in the shape of net results.

"I can remember that when employed on a prominent railway in the south five years ago, I resurrected a No. 8 Monitor Injector, thrown into a wayside scrap pile by track men or a wrecking crew. It needed but 50 cents' worth of work to put it in order. To the men who so disposed of it, it was valueless."

"I believe that the great majority of enginemen wish to do what is best for their employers; that they require a vast amount of encouragement to induce them to do so is a fact also. Talking to them quietly, mildly, but persistently will bring results. Caustic letters hurt, and tend to make good men sore.

"This economy of employer's material is more far-reaching than many think it is. From it men learn personal economy and thrift, that never fails to make them more valuable to family, employer and society."

LOCOMOTIVE BUILDING.

The Texas Midland will shortly order six locomotives.

Specifications of new engines of different classes are now being prepared by Mr. W. T. Reed, Superintendent of Motive Power and Machinery of the Seaboard Air Line, but we believe that the number of engines to be ordered has not yet been decided upon, and no orders will be placed until next spring.

The Baldwin Locomotive Works have received the following among other recent orders: Thirteen for Japan, of which six are passenger and seven freight locomotives; seven consolidation engines for the Norfolk & Western, six consolidation engines for the Union Pacific, Denver & Gulf, and five heavy consolidation freight locomotives for the Colorado Midland. The company is also engaged upon the designs for eight locomotives for China, the order for which was received some weeks ago. Fifteen heavy compound freight engines for the Louisville & Nashville are also being constructed and several of this lot have been completed.

The 18 engines to be built by the Rogers Locomotive Works for the Japanese government are to be of the mogul type, 3 ft. 6 in. gage. The design of these locomotives is mainly that of the builders, and has no special peculiarity. The specifications which were furnished aside from those for the tests in quality of materials to be used only included the diameter of drivers, weight, total wheel base of the engine and tender, boiler pressure and maximum load to be hauled on 2½ per cent. grades. The service will be mixed freight and passenger. The fuel to be used is bituminous coal mined in Japan, which is said to be about medium in quality for steaming purposes.

The rigid wheel base will be 11 ft. 6 in.; total wheel base of engine, 18 ft. 8 in., and total wheel base of engine and tender, 40 ft. The rear driving-axle will be located under the firebox. The driving-wheels will be 48 in. in diameter, with cast-iron centers and hollow spokes and rim. Radial trucks will be used with steel-tired wheels 28 in. diameter, and centers of cast iron with hollow spokes. The weight in working order will be 92,000 lbs. The cylinders will be 16 × 22 in. The boilers will be of the straight-top type, 56 in. in diameter, and of steel $\frac{1}{2}\frac{3}{8}$ in. thick, with extended smokebox and pressed steel front, the crown-sheets to be supported by radial stays; boiler pressure, 170 lbs. The firebox will be of steel, 90 in. long, 24 in. wide at grate, and 45 in. in crown sheet, 56 in. deep in front, and 48 in. at back above the grate. The tubes, 173 in number, will be 2 in. in diameter and 10 ft. 3 in. long.

The tender will be of the ordinary 8 wheel pattern with trucks of the Diamond type, having elliptical springs. The wheels will be of wrought iron, spoke pattern, 26 in. in diameter, with steel tires. The capacity of the tank will be 2,600 gals.

All axles and crank pins will be of steel, and bearings of phosphor bronze. The valve motion will be of the ordinary link type. Crossheads and guides will be of steel of the Laird type. Packing will be of the Stevens pattern. Smith's automatic vacuum brake will be applied to all the driving and tender wheels.

CAR BUILDING.

The Grand Rapids & Indiana is asking bids on 100 ore cars.

The Nashville, Chattanooga & St. Louis is reported to be in the market for 1,000 cars.

President Diaz, of Mexico, has placed an order with the Berney & Smith Car Co., at Dayton, for the construction of a palace car train. The order covers dining, sleeping and library cars, and other cars.

The Jackson & Woodin Manufacturing Co., of Berwick, Pa., is building for the Bangor & Aroostook 408 platform cars, 180 box cars and 5 cabooses, fitted with Westinghouse brakes and automatic couplers.

The St. Charles Car Works, St. Charles, Mo., have received an order for 300 coal cars from the St. Louis & San Francisco, 50 platform and 50 coal cars from the Texas Midland, and 14 cars from the Choctaw, Oklahoma & Gulf.

BRIDGE BUILDING.

Buffalo, N. Y.—Bids were received Dec. 2 for the superstructure and postbents of the Chicago street viaduct, together with the approach in Exchange street connecting with the viaduct, as follows: Buffalo (N. Y.) Bridge & Iron Co., $124,028; Buffalo (N. Y.) Engineering Co., $127,955; Detroit (Mich.) Bridge & Iron Works, $118,293; Elmira (N. Y.) Bridge Co., $122,850; King Bridge Co., Cleveland, O., $125,512; Penn Bridge Co., Beaver Falls, Pa., $128,293; Pennsylvania Steel Co., Steelton, Pa., $132,550; Rochester (N. Y.) Bridge & Iron Works, $138,720; Toledo (O.) Bridge Co., $118,063.

Elkland, Pa.—The bridge over the Cowanesque River at this point is to be lengthened about 30 ft. It is now 150 ft. long. The iron piles on which it stands have settled, and the whole structure is to be taken down and built over. The contract for the work is $2,600.

Elkton, Va.—The County Commissioners ask for bids until Jan. 5, for a 450-ft. iron or steel double-track bridge over the Shenandoah River, at this place. G. R. Eastman and J. G. H. Miller are a committee.

Green Bay, Wis.—Bids were opened Dec. 4 for the new 182½-ft. steel swing span of the bridge over Fox River at Main street, as follows. The first figure noted is in each case the bid for the draw, and the last is the total, which includes the draw, four lines of 12-in. I-beam stringers for street railroad, supports for trolley wires and steel floor joists: Indiana Bridge Co., $9,600, $10,400; King Bridge Co., $8,614, $9,714; Lafayette Bridge Co., $8,105, $8,995; Massillon Bridge Co., $9,000, $9,975; Milwaukee Bridge & Iron Works, $8,189, $9,141; Penn Bridge Co., $9,200, $10,215; Pittsburgh Bridge Co., $9,929, $11,008; Toledo Bridge Co., $8,200, $9,240; Watertown Bridge Co., $8,493, $9,768; Wisconsin Bridge & Iron Co., $7,100, $7,972; Wrought Iron Bridge Co., $9,470, $10,465; Youngstown Bridge Co., $9,145, $10,238.

Greene, Me.—The Berlin Iron Bridge Co. has just completed a new steel bridge for this town, and has in hand the construction of a steel bridge about 100 ft. in length for the Cabot Mfg. Co., at Brunswick, this state. It has also recently received contracts for bridges at Auburn, Pembroke, Turner, Buckfield and Bridgeton, Me.

Indiana, Pa.—A new bridge has been recommended over Yellow Creek, in Cherryhill Township.

New Bloomfield, Pa.—C. S. Albright has been awarded the contract to build a new county bridge at Mt. Patrick. It is to be 24 ft. between abutments.

Oakland, Cal.—At a conference between the supervisors of Almeda County and officials of the Southern Pacific it was practically settled that a steel bridge to accommodate the traffic between Oakland and Alameda and the trains of the Southern Pacific will be built across the estuary forming Oakland harbor. The company declared that it was in favor of building the proposed bridge in conjunction with the supervisors, each paying a share of the cost.

Oswego, N. Y.—It is stated that the Department of Public Works has decided to widen the East Bridge at a cost of about $10,000. F. J. O'Brien, Superintendent of Public Works.

Oxford, Pa.—The trestle bridge across Big Elk Valley, between Elk View and Lincoln, on the Central Division of the Philadelphia, Wilmington & Baltimore, north of here, will be supplanted by an iron bridge.

St. Charles, Mo.—It is stated that at a recent meeting the Board of Directors of the St. Charles & St. Louis Bridge Co. adopted a resolution providing that its proposed bridge be a draw bridge, and a committee has been appointed to solicit stock. A proposition of the Penn Bride Co. has been taken under consideration.

St. Johnsville, N. Y.—The contract for a steel highway bridge of two spans, 216 ft. each, with a 20-ft. roadway and a 5-ft. sidewalk, masonry pier and abutments, to be built over the Mohawk River, has been awarded to the Groton (N. Y.) Bridge & Mfg. Co., at its bid of $27,000. The other bids, received Nov. 13, that were considered, were those of the Berlin Iron Bridge Co., $30,534; Horseheads (N. Y.) Bridge Co., $28,890; Owego (N. Y.) Bridge Co., $31,000, and the Wrought Iron Bridge Co., Canton, O., $28,997.

Uniontown, Pa.—The Pennsylvania is preparing to build a new iron bridge at Redstone Junction at the intersection of the Pittsburgh, Virginia & Charleston and the Southwest branches. The bridge now in use was damaged by the floods, and will be replaced by a new and larger structure.

Youngstown, O.—The County Commissioners, at a recent meeting, made their first move in the direction of building three bridges over the Mahoning River in this city by voting to erect a grade bridge at Spring Common, and bids will be called for next month. Objections were made to a grade bridge at this point for the reason that it will be necessary to cross the tracks of the Pennsylvania, the Erie, and the Pittsburgh & Western, but the Commissioners decided that an overhead bridge was impracticable.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Supreme Court of the United States it is decided that the statute of 1887, authorizing suits to be brought against receivers of railroads without special leave of the court, was intended to place receivers upon the same plane as railroad companies, as respects their liability to be sued for acts done while operating a railroad, and as respects mode of service.[1]

In the Supreme Court it is held that specific performance of a contract whereby one railroad company lets another into the joint use of its bridge and terminals will not be refused on the ground that it involves continuous acts requiring skill, judgment and technical knowledge.[2]

In North Carolina the Supreme Court rules that the receivers of a railroad are bound to account for and apply the income of a leased road in accordance with the covenants of the lease as long as they operate it, and the claim of the lessor for rent accrued while its road was so operated is a valid set-off against a claim for supplies and materials furnished by such receivers.[3]

In Texas authority given a railroad company, by its charter, to consolidate with any other company, does not confer authority upon another company to consolidate with it; and the power is, in effect, limited to a union with another company having like power.[4]

In the Federal Court it is held that a covenant by the lessee in a railroad lease that it "will pay, as operating

expenses, all taxes and assessments . . . which may be lawfully levied or assessed" upon the demised property, is not an assumption of liability for taxes already assessed and levied, and constituting a lien from the beginning of fiscal year in which the lease is made.[5]

In Minnesota, the shipper of goods consigned them to himself, and received a bill of lading accordingly. The railroad delivered them, with a proper waybill, to the next connecting road, who, at the shipper's request, delivered the goods to him in transit at an intermediate point, without the surrender or cancellation of the bill lading, which he thereafter, and before the goods would have arrived at their original destination if the transit had continued, pledged, in the usual course of business, to an innocent pledgee, for value. The Supreme Court rules that the latter railroad is liable to the pledgee for failure to deliver the goods at the place of destination, and is estopped from showing such interme diate delivery to the shipper.[6]

In Missouri it is held that where the contract of carriage provides for the payment of a lesser rate of freight than that specified in the schedules published by the carrier, in violation of the interstate commerce act, the carrier may still recover the rates fixed by the printed schedule.[7]

In Kentucky it is held that a postal clerk engaged on a train in the service of the government, whom the railroad company was bound to carry by contract with the government, is a passenger.[8]

Injuries to Passengers, Employes and Strangers.

In Texas plaintiff, a married woman, while traveling alone with her baby, was transferred to a station of defendant's road, over which she had a valid ticket, purchased from a connecting line, and which included her transfer from one road to the other. The station was kept open at all times, both day and night for the use of passengers; and plaintiff remained there to await her train, which would not arrive for 10 hours, with the assent of defendant's agent While alone in the waiting-room at night, she was assaulted by defendant's night agent. The Supreme Court rules that she was a passenger, and that the defendant was liable for the act of its employee.[9]

In Texas plaintiff purchased a ticket from defendant's agent at D., for transporation over defendant's and connecting lines to S., and return, which the agent neglected to stamp as required by regulations. Plaintiff traveled to S. on the ticket, but on presenting it to the agent of the connecting line at S, to be stamped for the return trip, as required by the terms thereof, the agent refused to do so, because of the absence of the stamp of the selling office. Plaintiff boarded the train, tendered the ticket, which was refused, and, declining to pay his fare, he was ejected. The Supreme Court holds that plaintiff was entitled to recover the actual damages sustained by reason of the failure of defendant's agent to properly stamp the ticket, even though it was stipulated that, in selling the ticket, defendant acted only as agent for connecting line, and should not be responsible beyond its own line.[10]

In Indiana it appeared that a passenger called for and paid for a ticket from one station on a railroad to another; that the agent gave him an unused coupon of an excursion ticket, and, in reply to the passenger's request for an explanation, assured him that it was all right and would be accepted by the conductor; that the depot was so poorly lighted that the passenger could not read the ticket; and that, relying on the agent's assurance, he boarded the first train for his destination, tendered his ticket, which was worthless by reason of expired limitations, and was ejected. The Supreme Court holds that the passenger was without fault and could recover damages for his ejection [11]

In Ohio, where a brakeman who stepped off the pilot of an engine between the rails while the train was moving from four to six miles an hour on a dark and rainy night, in order to go forward and turn a switch, slipped and was run over, the Court held, as a matter of law, that no recovery could be had, in the absence of any evidence to rebut the presumption of negligence on the brakeman's part arising from such facts.[12]

In Iowa it is decided that a rule of a railroad being that the conductor will have control of and be responsible for movements of the train "except when his directions conflict with these rules or involve risk or hazard, in either of which cases the engineer will be held alike accountable," an engineer will be held guilty of negligence, contributory to a collision in which he was fatally injured, where, in obedience to the order of the conductor, he left a station behind time, knowing that the first section of a train coming in the opposite direction, if running on time and according to rules, would be met between that and the next station, that a telegram received there stated that the second section of the other train would be met at the next station, and that the clearance card received there from the operator stated, "I have no further orders for your train"; he having no right to assume that the conductor had information relating to the first section of the other train which justified their running on its time [13]

In Alabama, on the issue as to whether the railroad company had waived a rule requiring the engineer to keep the train under control when approaching a certain station, it appeared that, eight days prior to the accident, the engineer acknowledged the receipt of a list of rules, in which was included the rule in question, and bound himself to observe the same. It was held by the Supreme Court that the fact that, prior to the receipt of the rules by the engineer, it had been customary on the part of the company's employees to disregard the same, is sufficient to show that obedience to the rule on the part of the engineer at the time of the accident was waived.[14]

In Kansas it is held that where a railroad track is rock ballasted, and in good order, and trains can safely run over it as fast as 40 or 50 miles an hour, the fact that there are low joints in places, caused by the ground being wet, and the frost coming out of the ground, which defect cannot be helped in railroading, does not establish negligence of the company, in regard to the condition of the track, toward its employees.[15]

In Texas in an action by a switchman for injuries there was evidence that defendant's foreman ordered plaintiff to couple a moving caboose to freight cars, and that, after he stepped in between the cars to do so, the caboose was struck by other cars, without warning to plaintiff, injuring him. Defendant alleged that the injury was caused by plaintiff's contributory negligence. The Supreme Court rules that it was not error to admit evidence that it was not the custom to order a switchman to make a coupling, and then order the cars between which the coupling is being made to be struck without notifying the switchman.[16]

In North Carolina it is held that a section hand, who, contrary to the orders of his foreman, goes into a cut in the road before a train has passed and is injured, is guilty of contributory negligence.[17]

In Connecticut it appeared that deceased was an employee in shops not owned by defendant, located on either side of its tracks; that there was a crossing leading from a street to the shop where deceased worked, and which was practically the only entry to such shops; that, for over 30 years, defendant had kept it planked, and in condition for use for the 300 or 400 people employed in such shops in going to and from their work, and for the teams for their employer; that it was used, as defendant knew, by such employees, in crowds at a time, at certain hours of the day, and at other hours was practically unused, and that as deceased was returning to his work, after dinner, he was struck by a car which had just been detached from an engine while making a flying switch. The Supreme Court rules that a finding that defendant was guilty of negligence would not be disturbed, the record not disclosing any error of law in deciding the questions either with respect to the relation which the parties sustained, or as to the duties they owed to each other, etc.[18]

In Pennsylvania the fact that a railroad has erected gates at a street crossing in a city, but keeps them open without any watchman in charge of them, warrants a jury, without more, in drawing the inference that such company was negligent.[19]

[1] Eddy v. Lafayette, 16 S. Ct. Rep., 1082.
[2] U. P. v. C., R. I. P., 16 S. Ct. Rep., 1173.
[3] C., C. & A. v. C. & L. N. G., 24 S. E. Rep., 769.
[4] Morrill v. Smith County, 36 S. W. Rep., 56.
[5] Cleveland v. Spencer, 73 Fed. Rep., 559.
[6] Ratzer v. B., C., R. & N., 66 N. W. Rep., 988.
[7] Gerber v. Wabash, 1 Mo. App. Rep., 792.
[8] L. & N. v. Kingman, 35 S. W. Rep., 264.
[9] St. L. S. W. v. Griffith (Tex. Civ. App.), 35 S. W. Rep., 741.
[10] Russell v. M., K. & T., 35 S. W. Rep., 724.
[11] Callaway v. Melleti, 41 N. E. Rep., 198.
[12] Grant v. P. & W., 10 Ohio Cir. Ct. R., 362.
[13] York v. Ch., M. & St. P., 67 N. W. Rep., 414.
[14] L. & N. v. Mothershed (Ala.), 20 South. Rep., 67.
[15] Atchison v. Croll, 45 Pac. Rep., 112.
[16] Missouri, K. & T. v. Crane (Tex. Civ. App.), 35 S. W., 797.
[17] Styles v. R. & D., 24 S. E. Rep., 740.
[18] Pomp mio v. N. Y., N. H. & H., 34 Atl. Rep., 491.
[19] Hughes v. D. & H. Canal Co., 1 Lack. Leg. N., 215.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago Junction Railway & Stock Yards Co., quarterly, 1¼ per cent. on preferred stock and a semi-annual of 4 per cent. on common stock, both payable Jan. 2.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on preferred stock, payable Jan. 2.

Manhattan, quarterly, 1¼ per cent., payable Jan. 2.

Minneapolis & St. Louis, 2½ per cent. on first preferred stock and 1½ per cent on second preferred stock, both payable Jan. 15.

Old Colony, quarterly, 1¾ per cent., payable Jan. 1.

Northern of New Hampshire, quarterly, 1½ per cent., payable Jan. 1

Providence & Worcester, quarterly, 2½ per cent., payable Dec. 31.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Mobile & Ohio, special, New York, Dec. 23.

Philadelphia, Wilmington & Baltimore, annual, Wilmington, Del., Jan. 13.

Pittsburgh & Lake Erie, annual, Pittsburgh, Pa., Jan 25.

Rome, Watertown & Ogdensburg, annual, Central Trust Co., New York, Dec. 28.

St. Louis, Vandalia & Terre Haute, annual, Greenville, Ill., Jan. 12.

San Francisco & North Pacific, annual, 222 Sansome street, San Francisco, Cal., Jan 19

Terre Haute & Indianapolis, annual, Terre Haute, Ind., Jan 4.

Western New York & Pennsylvania, annual, 104 South Fifth street, Philadelphia, Pa., Jan. 11.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of General Baggage Agents* will hold a convention at Richmond, Va., on Jan 20, 1897.

The *International Association of Car Accountants* will hold a convention at New Orleans, La., on Feb. 23, 1897.

The *American Railway Association* will hold its convention at Richmond, Va., on April 7, 1897.

The *National Convention of Railroad Commissioners* will be held at St. Louis, Mo., on May 11, 1897.

The *International Association of Ticket Agents* will hold a convention at San Antonio, Tex., on March 10, 1897.

The *Association of American Railway Accounting Officers* will hold a convention at Richmond, Va., on May 26, 1897.

The *Association of Railway Claim Agents* will hold its convention at St. Louis, Mo., during the last week of May, 1897.

The *Master Car Builders' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 8, 1897.

The *American Railway Master Mechanics' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 15, 1897.

The *National Association of Local Freight Agents' Associations* will hold a convention at Washington, D. C., on June 8, 1897.

The *Association of Railway Telegraph Superintendents* will hold a convention at Niagara Falls, N. Y., on June 16, 1897.

The *National Association of Car Service Managers* will hold a convention at Boston, Mass., on June 16, 1897.

The *Train Despatchers' Association of America* will hold a convention at Detroit, Mich., on June 22, 1897.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736–1739 Monadnock Block, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

New York Railroad Club.

The regular meeting of the New York Railroad Club was held at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York, on Thursday evening, Dec. 17. A paper was read by Mr. E. E. Russell Tratman on "The Relations of Track to Traffic on American Railways."

Civil Engineers' Club of Cleveland.

A meeting of the Civil Engineers' Club of Cleveland was held Dec. 8, 1896, with 27 members and 20 visitors present. The paper of the evening was read by Mr. Jos. W. Willard on "Explosives: a brief history; their adaptation to the arts and to engineering: possible future use in warfare of so-called high explosives." The paper being a long one, only a part of it was read, and it was agreed to postpone reading the remainder and also the discussion until the next meeting of the club. It was voted to hold a semi-monthly meeting o

Western Society of Engineers.

A meeting of the Western Society of Engineers was held in the society rooms, Monadnock Block, Chicago, Wednesday evening, Dec. 9. Mr. Edward Barrington's paper, "Electric Traction," read at the last meeting, was discussed. Prof. D. C. Jackson, of the University of Wisconsin, presented a paper on "The Equipment of Manufacturing Establishments with Electric Motors and Electric Power Distribution," following which was a discussion by Mr. B. J. Arnold, Consulting Engineer; Mr. Geo. S. Morison, Consulting Engineer; Mr. M. Coster, of the Westinghouse Electric & Mfg. Company, and Mr. Geo Gibbs, of the Chicago, Milwaukee & St. Paul.

The next meeting of the society will be held on Dec. 23. A discussion of the papers, "Electric Traction" and "Power Distribution," which are mentioned above, will be followed by a paper on "Natural Distortion of Rock in Place, as shown by the Chicago Drainage Canal," by Mr. Charles L. Harrison.

Western Railway Club.

A meeting of the Western Railway Club was held Tuesday, Dec. 15, at the Auditorium Hotel, Chicago. The paper presented at the November meeting by Mr. J. H. McConnell, entitled, "Some of the Uses and Advantages of Compressed Air," was discussed. Topical discussions were also held on the following subjects: "What Can be Done to Further the Use of Correct M. C. B. Standards?" "What Additional Parts of Cars is it Wise or Feasible to Standardize?"

A paper was presented by Mr. A. M. Waitt, General Master Car Builder, Lake Shore & Michigan Southern Railway, on "Suggestions on Specifications for Construction and Inspection of New Rolling Stock."

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Prof. D. C. Jackson, of the University of Wisconsin presented a paper on "The Equipment of Manufacturing Establishments with Electric Motors and Electric Power Distribution," following which was a discussion by Mr. B. J. Arnold, Consulting Engineer, Mr. Geo. S. Morison, Consulting Engineer; Mr. M. Coster, of the Westinghouse Electric and Manufacturing Company, and Mr. Geo. Gibbs, of the Chicago, Milwaukee & St. Paul.

Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held on Monday evening, Dec. 7. Eleven members and six visitors were present. County Surveyors Wm. Danforth, of Goodhue County, and C. A. Forbes, of Dakota County, asked the co-operation of the society with the Minnesota Association of Surveyors' & Engineers, the Minneapolis Engineers' Club and the Engineering Department of the State University, in endeavor to secure legislation in the matter of licensing measurers of land. Mr. G. L. Wilson, Mr. C. F. Loweth and Mr. J. N. Armstrong will serve as a committee in this affair.

Mr. Max Toltz read a paper on "Paint Tests at the Great Northern Railway Laboratory." The result of the experiments pointed to graphite paints as best adapted for preservation of iron and steel structures. An hour's discussion followed the paper.

St. Louis Railway Club.

A regular meeting of the St. Louis Railway Club was held in the Southern Hotel, St. Louis, on Dec. 11, with 96 members and a number of visitors present. A paper by C. W. Eckerson on "Increasing Locomotive Mileage by Lengthening of Runs," was read and discussed. Following this was a discussion on the paper read at the November meeting by Prof. J. B. Johnson, Chairman of the Executive Committee of the St. Louis Railway Club, entitled "The Mechanical Properties of Wrought Iron and Steel as Shown by Actual Tests." This paper, when read at the meeting of Nov. 13, was illustrated by fifty stereopticon views. Following this discussion, a paper was presented by J. R. Cavanagh, entitled "The Pooling of Freight Equipment."

The next meeting of the Club will be held the second Friday in January, when the paper on "The Pooling of of Freight Equipment," will be discussed, and a paper will be presented by John J. Baulch on "Progress and Advancement of St. Louis Terminal."

Central Railway Club.

The annual meeting of the club will be held at the Hotel Iroquois, Buffalo, N. Y., on Jan. 15, at which time officers will be elected for the ensuing year. Reports will be submitted at this meeting on the following subjects:

"As inconvenience is experienced in practice, is it necessary to apply repair cards indicating repairs made upon cars in transit, in view of the fact that such repairs are sometimes made by trainmen and others who have not the facilities to make such application? What exception, if any, should be made to the rule covering this question?" Committee: J. R. Petrie, George Faber, G. N. Dow, William Shone, Robert Potts.

"Brick Arches in Locomotive Fire Boxes." Committee: F. B. Griffith, George Hazleton, E. P. Mooney, A. E. Mitchell, George W. West.

"Apprentice Boys in Railroad Shops." Committee: John MacKenzie, M. L. Flynn, E. D. Nelson, W. G. Taber, W. Lavery.

Discussions will be held on the following subjects:

"What is the Best Plan to Bring About the Adoption of M. C. B. Standards by Railroads?" Committee: A. M. Waitt, G. W. West, R. S. Miller, James Macbeth, William McWood, John S. Lentz.

"Shall the Cubic Capacity of Ordinary Box Cars be Increased; and if so, what shall be the Maximum Limit?" Paper by H. H. Perkins.

The business session will be followed by the annual dinner in the evening.

PERSONAL.

—Mr. George P. Lyman succeeds Mr. T. H. Simmons as General Freight Agent of the Burlington, Cedar Rapids & Northern Railway.

—Mr. Henry Ingalls, President of the Wiscasset & Quebec road in Maine, and President of the First National Bank at Wiscasset, died last week.

—Mr. R. G. Stone, late General Freight Agent of the Georgia Southern & Florida, has been appointed General Passenger and Freight Agent of the Macon & Birmingham.

—Mr. R. G. Matthews, formerly General Superintendent of the Buffalo, Rochester & Pittsburgh, has been appointed General Sales Manager for the Mosier Safety Signal Co., of Cleveland and Galion, O.

—Mr. Frank Cole, Chief Clerk to General Freight Agent Sweet, of the Lake Erie & Western, has become Traveling Freight Agent to succeed Mr. T. O. Baker, promoted to be Division Freight Agent, with headquarters at Akron, O.

—Mr. Francis B. Clarke has been appointed General Traffic Manager on the Great Northern, which position was discontinued for some time but has now been revived. Mr. Clarke has been connected with the Great Northern and other Western roads for over 33 years.

—Mr. Isaac H. McEwen, formerly General Superintendent of the Rome, Watertown & Ogdensburg, has announced his candidacy for Railroad Commissioner, made vacant by the death of Mr. Rickard. In 1895 he resigned to study law, and has since practiced in that profession.

—Mr. A. J. Davidson, for some years Superintendent of the Gulf, Colorado & Santa Fe lines from Cleburne to Purcell and Cleburne to Paris, has tendered his resignation, effective Dec. 15. It is understood that Mr. Davidson will become Superintendent of Transportation of the St. Louis & San Francisco, with headquarters at St. Louis.

—Mr. J. E. Williams, Superintendent of the Wisconsin & Michigan road, has resigned, to take effect Jan. 1. It is understood that the office is to be abolished. For many years Mr. Williams was Manager of the Menominee and Marinette offices for the Milwaukee & Northern, and was afterward with the Chicago, Milwaukee & St. Paul up to the time the Wisconsin & Michigan was incorporated.

—Mr. O. P. McCarty, for a number of years past General Traveling Passenger Agent for the Southern Pacific, has been appointed Assistant General Passenger Agent of that road, with headquarters at New Orleans, the office of Traveling Passenger Agent having been abolished. Before the consolidation Mr. McCarty was General Passenger and Ticket Agent of the Ohio & Mississippi, now part of the Baltimore & Ohio Southwestern.

—Mr. William J. Fransioli has been appointed General Manager of the Manhattan Railway Co. (Elevated), of New York, of which he has been Acting Manager since the death of the late Frank K. Hain. Mr. Fransioli has been in the service of the company for about fifteen years, and was Colonel Hain's secretary and assistant during the last five years of the latter's service. His first service was a ticket agent and telegraph operator.

—Mr. Geo. W. Dickinson, formerly General Manager of the western lines of the Northern Pacific, has left Tacoma, Wash., which has been his headquarters, and expects to take up his residence in New York. Mr. Dickinson was General Superintendent of the Western Division of the Northern Pacific when Mr. Burleigh became Receiver of the Washington, and he became General Manager under his receivership, resigning when the new company took over the property.

—Mr. P. Ryan, Superintendent of the Kalispell and Montana divisions of the Great Northern, died at Kalispell, Mont., Dec. 3, after a brief illness. Typhoid pneumonia, resulting from exposure and overwork at the recent washout, is said to have been the cause of his death. For over 20 years he had been in the service of the Great Northern and its predecessor companies. Beginning as water boy, then as section laborer, he rose by force of merit through the various positions of Section Foreman and Roadmaster to Division Superintendent of 950 miles of the road. His life was an example of what persistent, honest, hard work, combined with good sound common sense, will accomplish.

—Mr. Charles Stewart Smith has been appointed Rapid Transit Commissioner of New York City, to succeed the late William Steinway. Mr. Smith is a former President of the Chamber of Commerce of New York, and held that office when the act under which the present commission was organized was passed. The President of the Chamber of Commerce was named as one of the Commissioners in the act, and it was expected that Mr. Smith, who held that office when the bill was framed, would be a Commissioner, but when it became a law he had been succeeded by Mr. Alexander Orr, who therefore became a Commissioner, and continues to act. Mr. Smith is now about 64 years old and has retired from business.

—Mr. J. H. Winder, formerly General Manager of the Seaboard Air Line and after his retirement from that office President of the Seaboard Air Line Belt road at Atlanta, one of its subsidiary companies, has withdrawn his suit for heavy damages against the officers of the company for alleged libelous statements. Mr. Winder's suit was based on certain resolutions of the Directors, which Mr. Winder asserted amounted to a charge of misappropriation by him while General Manager. The Directors in their answer to his suit disclaimed this interpretation and state that his accounts have been found to be correct. After this answer Mr. Winder accepted an offer to discontinue the suit, the company agreeing to pay his salary to October 1 and the costs of the suit.

—Col. Oliver Eldredge McClellan, formerly Superintendent of the Middle Division of the Pennsylvania Railroad, with headquarters at Harrisburg, died last week at his home in Germantown, Pa., aged 43 years. He retired from railroad life several years ago. In early life he was in the engineering department of the Northern Pacific and then with the Atlantic & Great Western until he entered the service of the Pennsylvania as assistant engineer, at Altoona. He had charge of the construction of the Canton elevator in 1874 after which he was Superintendent of the Washington street elevator in Philadelphia. From 1879 to 1882 he was the General Agent in Philadelphia and at the latter date was transferred to Harrisburg as Superintendent of the Middle Division.

—Mr. John D. Parsons, Vice-President and General Manager of the West Chicago Street Railroad Co., has been elected Vice-President and General Manager of the Union Traction Co., of Philadelphia. Mr. Parsons began his street railroad career in Philadelphia as a clerk on the old Philadelphia & Darby line and by strict attention to duty he soon merited and received promotion. His advancement was rapid, and he has come to be regarded as one of the ablest managers of street railroad line in this country. His business-like control of the Lombard & South Streets line in Philadelphia secured his appointment as President of the Germantown Railway Co., which position he held until he went to Chicago. His conservative and careful management of this latter line has placed it on a sound financial basis.

—Mr. Charles A. Prouty, of Vermont, was nominated this week by the President to be Interstate Commerce Commissioner to succeed Hon. Wheelock G. Veazey, resigned on account of ill health. Mr. Veazey is a man of strong character and conservative views. He became a Commissioner in 1888 to succeed Col. Aldace F. Walker. Like Mr. Veazey Mr. Prouty is appointed from Vermont, where he is known as one of the ablest lawyers of the state. He has held various honorary positions in his profession, being now President of the Vermont Bar Association. He is a graduate of Dartmouth College, where he took high honors, and is now about 40 years old. He has practiced chiefly in corporation law. His home is in Newport, in the extreme northern section of the state. He was strongly recommended by Senator Proctor, of Vermont, Ex-Senator Edmunds and Hon. E. J. Phelps.

—Mr. M. L. Hinman, who has been President of the Brooks Locomotive Works for the past four and a half years, has retired from the presidency on account of ill health and F. H. Stevens was elected President at the recent stockholders' meeting. The following officers were also elected: R. J. Gross, Vice-President; M. L. Hinman, Treasurer; T. M. Hequembourg, Secretary, and David Russell, Superintendent. Mr. Stevens the newly-elected President, associated himself actively with the work in February, 1892, immediately after the death of Edward Nichols. In February, 1893, he was appointed Assistant to the President which office he has filled up to the present time. For much of the past year, on account of the ill health of President Hinman, the responsibility of directing the affairs of the locomotive works has devolved largely on Mr. Stevens. The office of Assistant to the President has been abolished. Mr. Hinman has been actively connected with the Brooks Locomotive Works since its organization in 1869, being Secretary and Treasurer until the death of Mr. Brooks in April, 1887. He was elected Vice-President in that year and in March, 1892, was elected President, to fill the vacancy caused by the death of Mr. Edward Nichols.

—Mr. Michael Rickard, State Railroad Commissioner of New York, died suddenly on his way to his office in Albany on Saturday of last week. Mr. Rickard was first appointed a commissioner in November, 1887, by Governor Hill to succeed John D. Kernan, of Utica, resigned, and he was reappointed in 1893. His present term would have expired in 1898. His successor, who will, therefore, have a little over a year of the unexpired term to serve, must be a railroad man, Mr. Rickard having been appointed to fill that requirement of the law which provides for one commissioner with practical railroad experience. Before his appointment as commissioner Mr. Rickard was a locomotive engineer on the New York Central, and his appointment was urged by the railroad labor organizations in the state. He had been with the New York Central as station agent, fireman and locomotive engineer all his life. With Mr. Rickard's death and the expiring terms of Commissioners S. A. Beardsley and Alfred C. Chapin the Republican administration in New York state will have an opportunity to reconstitute the entire commission, which for some years past has been composed entirely of Democrats.

Mr. Frank S. Gannon, now General Manager of the Staten Island Rapid Transit Railroad and ferries, will on Jan. 1 become Third Vice President and General Manager of the Southern Railroad. The duties which he assumes are onerous and complex, but his ability has long been shown in many difficult positions. The Staten Island Rapid Transit line is not a large line, but it is the New York freight terminus of the Baltimore & Ohio, and in summer not infrequently carries 90,000 passengers daily. Mr. Gannon has managed the property for 10 years, and since 1890 has held the title of General Superintendent of the New York Division of the Baltimore & Ohio. He has been in railroad service since 1868 and is now about 45 years old. His first work was as a telegraph operator on the Erie, but within two years he was in the service of the old New Jersey Midland as train dispatcher and in other positions. In 1875 he went to the Long Island to introduce the train order system, and remained there as Chief Dispatcher and Master of Transportation until 1881, during which the various independent lines were merged into the present company. He left to go to the Baltimore & Ohio as supervisor, but in a few months became General Superintendent of the old New York & Northern, where ability and the hardest work were required to make both ends meet. In 1886 he went to the Staten Island Rapid Transit and has since been building up that line.

—Mr. Almet E. Reed, Superintendent Sunbury Division of the Pennsylvania, has been appointed Superintendent of the Altoona Division, to fill the vacancy caused by the death of Robert E. Marshall; W. B. McCaleb, Superintendent Bedford Division, has been transferred to be Superintendent Sunbury Division; F. P. Abercrombie, Assistant Engineer Eastern and Susquehanna divisons, becomes Superintendent Bedford Division. Mr. Reed entered the Altoona shops in 1875, and in the following year was appointed Supervisor of the Pittsburgh Division. In 1884 he became Assistant Engineer of the Tyrone Division, and in 1893 was appointed Assistant Engineer of the Maryland Division, and in 1895 he became Superintendent of the Lewistown Division. In the same year he was promoted to be Superintendent of the Sunbury & Shamokin Division. Mr. McCaleb was born in May, 1862, and in 1880 he became connected with the Pennsylvania in the engineering department. In 1882 he was appointed assistant engineer, in 1886 Assistant Supervisor, and in 1886 Supervisor of Tyrone Division, and later of the Philadelphia Division. In December, 1889, he became Assistant Engineer West Pennsylvania Division, and then Superintendent of Bedford Divison. Mr. Abercrombie entered the service of the company in 1875. After service as Supervisor and Assistant Engineer, in 1891 he became Assistant Engineer of the Eastern & Susquehanna Division.

—Mr. John Hickey, Superintendent of Motive Power, Rolling Stock and Machinery of the Northern Pacific, has resigned that office, and has been succeeded by Mr. E. M. Herr. He has held that office since 1891, and was previously Master Master Mechanic of the Lake Shore & Western road. Mr. Herr is now Assistant Superintendent of Motive Power of the Chicago & Northwestern, being appointed to that office just about a year ago. He has had an unusually varied experience in railroad service. After his graduation from the Sheffield Scientific School he became an apprentice in the shops of the Chicago, Milwaukee & St. Paul. He was afterward with the Chicago, Burlington & Quincy as Engineer of Tests, Superintendent of Telegraph and Division Superintendent, and then returned to the Chicago Milwaukee & St. Paul as Master Mechanic. He left that office to accept the superintendency of the Grant Locomotive Works. When those shops closed he spent a year or two in Europe studying railroad matters. His admirable articles on German railroad practice, which he wrote for the *Railroad Gazette*, as one result of that journey, will be recalled. Soon after his return to this country he became Manager of the Gibbs Electric Works, at Milwaukee, but in a short time he returned to Europe to investigate the conditions affecting the establishment of a locomotive works in Russia, which was proposed by an American company, and which are now well on toward completion.

—Mr. J. R. Kendrick, Third Vice-President of the New York, New Haven & Hartford, died very suddenly in Boston on the afternoon of Friday last while riding in a cab from his office to his home. Mr. Kendrick had been apparently in excellent health and had spent the morning at his office, and had made various appointments for the following days. His death is attributed to heart trouble, of which he had slight indications a number of months ago.

Mr. Kendrick was born in New Hampshire in 1832, being a son of James H. Kendrick, Cashier of the local savings bank, and early in life was a clerk on the Central Vermont and on other local roads. About 1858 he became General Freight Agent of the Manchester & Lawrence and in 1866 Assistant Superintendent, a few months later being elected Superintendent, to succeed the former Superintendent, Mr. J. A. Gilmore with whom Mr. Kendrick had served for some time as clerk. He held this office about four years and then went to the New Orleans & Mobile as General Manager, where he demonstrated his talents as an administrator. This road, now a part of the Louisville & Nashville, was then under construction, and was owned chiefly in Boston. Mr. Kendrick found the affairs of the company very much involved, but he successfully readjusted matters. His health, however, was much impaired, and he soon accepted an offer of Governor Stearns, then President of the Old Colony road, to take the superintendency of that line. His labors have since then been identified with the lines of that company. For years he was General Manager of the railroad as well as President of the Old Colony Steamboat Co., until its consolidation with the New York New Haven & Hartford. When that occurred he was made Third Vice President of the consolidated company, in charges of the lines east of New London. Mr. Kendrick was of a retiring disposition, and was not often met where railroad officers congregate. Among the officers of his own company, subordinates and superiors alike, he was very highly esteemed being not only just but generous in his business dealings, and uniformly amiable in his personal relations.

—We regret to have to announce the death of James Lyons Cleminson, Esq., M. Inst. C. E., Nov. 15, at his residence in London. He was well known in railroad work. He was born Oct. 11, 1840 and was the eldest son of John Cleminson, Esq., who was Locomotive Superin-

tendent of the Iquique, or the original Nitrate Railway, and who was also a naval engineer and had fought in the Baltic, likewise under Garibaldi.

Mr. James Cleminson was educated at Genoa and Marseilles, and at an early age gave indication of engineering skill. He served his apprenticeship under Mr. John England, of Hatcham Iron Works, and was then employed as Chief Draftsman to the Somerset & Dorset Railway. He afterward went to London and was appointed Manager to Mr. Robert Fairlie, with whom he was intimately associated in designing and bringing out the Fairlie locomotive.

In 1874 he began business as a civil and consulting engineer, and among the many projects with which he has been identified as Consulting Engineer are the Buenos Ayres & Pacific Railway (of which he was the originator), Bahia Blanca & North Western, Villa Maria & Rufino, Bahia & San Francisco and the North Wales Narrow Gage Railway. He was also Consulting Engineer to the only railroad in China, viz., the Imperial Railway of North China, and he was created a mandarin in recognition of his distinguished services. He had also various decorations from different parts of the world. He was the inventor of the Cleminson composite wheel and of a flexible wheel base. He was a member of the Institute of Civil Engineers and of the Institute of Mechanical Engineers, a Fellow of the Royal Geographical Society, etc.

Mr. Cleminson devoted himself much to the study of the chemical composition of steel, and in his extremely useful life his labors were herculean, a love of his profession and an untiring energy being his chief characteristics. Above all things he was fearless and thoroughly conscientious in the discharge of his duties, and, notwithstanding the painful nature of the maladies from which he suffered for many years, he stuck to his post up to within a fortnight of his death.

ELECTIONS AND APPOINTMENTS.

Boston & Albany.—Marshall Newell, a son of the late John Newell, President of the Lake Shore & Michigan Southern, has been appointed Assistant to the Division Superintendent, E. I. Sackett, at Great Barrington. Mr. Newell is a graduate of Harvard University.

Chester County Central.—The incorporators of this company are W. I. Kirk, West Chester, Pa., President; Archibald R. Dewey, Frederick W. Rush, Joseph B. Willits and George H. Fettus, of Philadelpia, and A. Oliver Winchester, Narbeth, Pa.

Galveston, La Porte & Houston.—The office of Roadmaster, held by Mr. Westbrook, has been abolished and the duties of that office will hereafter be attended to by the Superintendent.

Great Northern.—J. P. Rogers has been appointed Acting Superintendent of the Kalispell Division, and Mr. R. H. Bowron has been appointed Superintendent of the Montana Division, vice Mr. P. Ryan, deceased.

Hartford & Connecticut Western.—The annual meeting of the company was held in Hartford on Dec. 15. The following directors were chosen: A. A. McLeod, of New York; W. R. Taylor, John W Brock, W. W. Gibbs, Charlemange Tower, Jr., of Philadelphia; H. O. Seixas, of New York; J. H. Appleton, of Springfield; J. O. Phelps, of Stansbury; Henry Gay, of Winstead; E. W. Spuso, of Falls Village, Chas. E. Gross, of Hartford, and Daniel L. Freeman, of Canaan.

Nashville, Chattanooga & St. Louis.—Only eight of the old directors were re-elected at the stockholders' meeting at Nashville, Dec. 8. All the New York members and one Tennessee director retired, as follows: J. S. Rogers, Thomas W. Evans, O. H. P. Belmont, J. D. Probst, E. B. Wesley, of New York, and L. H. Lanier, of Memphis. The following were elected in their places: E. C. Lewis, E. W. Cole, W. A. Goodwin, J. B. Richardson, W. L. Danley, E. W. Thompson, of Nashville, and M. H. Smith, of Louisville. There was one vacancy, due to the death of Michael Burns. The old directors who were re-elected are: E. L. Jordan, N. C. Collier, Murfreesboro; J. G. Aydelott, Tullahoma; A. H. Robinson, John Hill, Eakin; G. M. Fogg, J. W. Thomas, Nashville; J. E. Washington, Cedar Hill. The directors elected J. W. Thomas President and General Manager.

Pennsylvania.—A. E. Reed, Superintendent of the Sunbury Division, has been transferred to the Altoona Division, succeeding the late Robert E. Marshall. W. B. McCaleb, Superintendent of the Bedford Division, succeeds Mr. Reed at Sunbury. F. P. Abercrombie, of Williamsport, succeeds Superintendent McCaleb at Bedford.

Southern Pacific.—C. F. Smurr has been appointed General Traffic Manager in place of Richard Gray, who retires on account of ill health, with full pay. J. M. Crawley, Assistant General Freight and Passenger Agent at Los Angeles, goes to San Francisco as General Freight Agent. C. W. Luce, Assistant General Freight Agent at San Francisco, takes the same position at Los Angeles.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Chester County Central.—This company was incorporated Dec. 9 to build a road from Philadelphia to West Chester, with branches about 23 miles in length. William S. Kirk, West Chester, Pa., is president John S. Dove, Jr., Philadelphia, Pa., Director.

Columbia & Western.—The contract for the construction of the new road from Trail to Robson, B. C. has been awarded to a firm of Butte contractors. The price is said to be $580,000, and the road is only 20 miles long. The high cost is owing to its difficult construction. The Columbia & Western, of which the new line is an extension, will build two large passenger and freight steamers to run on the Robertson and the Upper Arrowhead Lakes, in connection with the new extension.

Condon Lane Boom & Lumber Co.—This company, of Horton, W. Va., has completed six miles of standard gage road and has contracted for the construction of 15 miles more to be built during the coming spring. The road is to connect the company's lumber plant with two large tracts of timber land lying to the south of Horton.

Dayton Northern.—This company, whose incorporation was noted in Ohio last week, proposes to build a line from Franklin, a point a little south-east of Dayton north to Lima, O. The projectors are J. R. Megrue, C. N. Haskell and others who are identified with the building of the Lima Northern road. The proposed line will connect at Lima with that line, and will form practically a southern extension of it to Dayton, and a connection with the Big Four and Cincinnati, Jackson & Mackinaw at Franklin. It would parallel the Cincinnati, Hamilton & Dayton the entire way, as the Lima Northern does for a good portion of its route.

Detroit, Grand Rapids & Western.—The articles of incorporation of this company, which, as stated last week, succeeds the Detroit, Lansing & Northern, have been filed in Michigan. The company is organized with a capital stock of $5,693,500, of which $3,183,500 is preferred and $2,510,000 common. Charles Merriam and Alpheus Hard, of Boston, are trustees and hold all of the preferred and most of the common stock. The other incorporators are: R. H. Honeywell, Geo. Shattuck, George Whitney, George L. Abbott, Boston; Nathaniel Thayer, Lancaster, Mass.; John A. Burnham, Manchester, Mass.; F. H. Damon, Melrose, Mass.; F. A. Nimms, Muskegon, Mich.; Mark T Cox, Morristown, N. J.; C. M. Heald and J. E Howard, Grand Rapids, Mich.

Lake Superior & Ishpeming.—The company has decided to begin the extension of its line to the Ishpeming mines, in Northern Michigan immediately after the holidays. Over five miles of track, including sidings, will be put in.

Lime Rock.—The city government of Rockland, Me., has granted the railroad company the right to build and operate a spur on Sea street (to accommodate a large wholesale grocery establishment which is to build in the spring). The line will leave the present road just south of Sea street by a curve having a radius of 75 ft., and after crossing Sea street the center line will be 5 ft. from the curbstone on the north side of the street, the whole length of the spur being about 600 ft. The work will be in charge of O. H. Tripp, Chief Engineer.

Minneapolis, Ashland & St. Paul.—Rails are being laid on the new road. Two locomotives and 60 cars are expected next week. The road will have connections so that the Duluth South Shore & Atlantic trains will run into Ashland by Jan. 1. The new road has already contracted to haul 50,000,000 ft. of logs to be sawed at Ashland mills during the winter.

New York, New Haven & Hartford.—The United States War Department has granted authority to the company to build a bridge across the channel at Bridgeport Harbor, about 300 ft. south of the present bridge. This authority was required to enable the company to carry out its proposed plans for eliminating the grade crossings at Bridgeport, which have been agreed to by the city authorities. Now that the railroad company has authority to build the bridge it can begin active work on the changes at Bridgeport, which involve four-tracking as well as the elimination of grade crossings as soon as desired.

Pennsylvania.—The company has now the right of way for the four tracks through New Brunswick, N. J., by the purchase of the last remaining property on Washington street needed. The work of elevating the tracks is to be begun shortly.

Perry, Livingston & Wyoming.—A hearing will be giving by the New York State Railroad Commission Dec. 22, at the Chamber of Commerce, New York, on the application of this company for permission to build its steam road from Perry, Wyoming County, to Greggsville, Livingston County.

Queen Annes.—Work on this new line between Glenwood and Ellendale, Del., a distance of 10 miles, is progressing rapidly. About 250 workmen are engaged on the grading, and it is expected to be finished and ready for the laying of track in about six weeks. With the exception of some bridge work, the road is completed as far as Greenwood Lewes, the terminus of the road, is 15 miles from Ellendale, and on the coast of the Atlantic Ocean. Work will be commenced on this section as soon as the other is finished. William H. Bosley, President, states that the operation of the line between Baltimore and Greenwood will be commenced in about two months. From Baltimore to Queenstown, a distance of 30 miles, the route is by water.

Quincy, Omaha & Kansas City.—The contract for the construction of the gap of 34 miles of road between Trenton and Pattonsburg, Mo., to connect this road with the Omaha & St. Louis, line was let in the office of Chief Engineer Gillham, of the Kansas City, Pittsburgh & Gulf, at Kansas City. The contract includes grading, laying of ties and rails, and the construction of bridges. Work will be begun as soon as the weather will permit. The letting of the contract is another step in the execution of the Kansas City & Northern Connecting scheme. The new line, which is to connect Kansas City with Pattonburg, has been surveyed and the grading and laying of rails will be begun in the spring. The name of the consolidated lines will be the Omaha, Kansas City & Eastern, and the reorganization is now in progress. They will connect at Kansas City with the Kansas City, Pittsburgh & Gulf, affording a new direct line to the Gulf of Mexico from Quincy, Des Moines and other Northern cities.

Rio Grande, Sierre Madre & Pacific.—The track is now laid for 10 kilometers out of Juarez, opposite El Paso, Tex., and as soon as the overhead crossing of the Mexican Central is finished the track will be laid toward Corralitos at the rate of a mile a day. The grading is completedfor nearly 50 miles. Chief Engineer Fewson Smith states that the line will reach Corralitos next June.

St. Johns & Lake Eustis.—The gage of this road, which is one of the Plant lines, is to be changed at once from 3 ft. to standard, being the second of the Florida lines of the Plant system to be made standard gage in the present year. The St. Johns & Lake Eustis is about 50 miles long. It extends from Lane Park on Lake Harris, just south of Tavares, northeast around Lake Eustis to Astor on the St. Johns River, with a branch from a point on this line to Leesburg, where it connects with the main line of the Plant system, going through one of the best orange-growing districts of the state.

West Virginia & Pittsburgh.—Surveys are to be made for an extension from Cowen, W. Va., to the mouth of Cherry River, and thence through Nicholas County, to the Chesapeake & Ohio at Gauley Bridge. This extension has been under consideration for three years, but the financial conditions have not been favorable for the work to begin. It will give the lines a southern outlet, and open for development a large area of coal and timber land. The preliminary route has been surveyed several times.

Wilkes-Barre & Northern.—This road has now been completed from Luzerne Borough to Dallas, five miles. The new line runs parallel to the Harvey's Lake branch of the Lehigh Valley at Dallas. A station is now being built by the new company at Dallas directly opposite that of the Lehigh Valley. The road has already been graded a mile beyond Dallas toward Harvey's Lake.

Electric Railroad Construction.

Baltimore, Md.—The City & Suburban Railway Co. has asked for additional privileges in the extension of its lines in Baltimore.

Bangor, Me.—An electric railroad will probably be built from Bangor up the Kenduskeag Valley by the Penobscot Central Railroad Co. Among the petitioners for the road are E. O. Beal, of Bangor, I. C. Libby, of Waterville, and A. F. Gerald, of Fairfield. If the road is built it will run through the towns of Glenburn, Kenduskeag, Levant, Corinth, Exeter, Charlestown and Garland. The capital stock is $250,000, in 2,500 shares.

Beverley, Mass.—The Lyan & Boston Street Railway Co. has been granted a franchise to use electricity as the motive power on its Cove Branch, which is two miles in length.

Charleston, S. C.—The City Street Railway Co. will apply for a 50-year extension of its charter. It is proposed to entirely remodel its present system.

Clais, Me.—The Clais Street Railway Co. has made application to the City Council for permission to extend its line from the present terminus as far as the river on Main street.

Enfield, Conn.—The power house of the Enfield & Longmeadow electric road is nearly finished and the road will be in operation in a few days. The company proposes to extend its lines to Suffield and Somers during the coming season.

Greenville, Westchester County, N. Y.—The State Railroad Commission has granted the application of the Greenville & Schuylerville Electric Railway Co. to construct its road.

Hagerstown, Md.—The Hagerstown Railway Co. proposes to extend its road to Funkstown and Frederick, to pass through Myersville and Smoketown, with a branch to Boonsboro'. It is thus proposed to connect the cities of Hagerstown and Frederick, reference to which has been frequently made.

Hartford, Conn.—The Hartford Street Railway Co. will apply to the coming session of the General Assembly for an amendment to its charter, authorizing it to construct and operate a street railroad from the city line of Hartford through Franklin avenue and the Wolcott Hill road to the village of Griswoldville, and through such streets in the towns of Wethersfield and Rocky Hill as may be approved by the selectmen. Also to construct a road from the city line of Hartford through Newington to Newington Centre, and that the company may make traffic arrangements, leases and other contracts with, and to acquire the stock, franchises of other street railway companies, and may cross the tracks of other railroads above or below grade.

The Hartford, Manchester & Rockville Electric Railroad Co. has been granted permission by the selectmen of Vernon to build a line via the Burke Hill route. The company must build a 50-ft. roadway across private lands traversed, to include, beside the railroad track a 30-ft. roadway and a bicycle path. The work must be completed by June 30 next, and the fare to all parts of Vernon must not exceed five cents. Surveys will be commenced immediately.

The Bristol & Plainville Tramway Co. has advertised that it will ask this coming Legislature for an amended charter to extend its line to Thomaston by the way to Pequabuck, Terryville and Plymouth, and to build branch lines to Burlington and Harwinton. It also asks for permission to furnish electric lighting for the village of Terryville, and to light residences in the village named.

Contracts were signed on Dec. 15 for the construction of a large electric power house to be built at Berlin, Conn., at an estimated cost of $100,000, for the purpose of supplying power to operate the Berlin and Middletown branches of the Valley division of the N. Y., N. H. & H. R. R., and the New England road from New Britain to Hartford. It is also proposod to operate the electric street car lines in Meriden by power from the Berlin station. The boilers, 10 in number, will be built by Edward Kendall & Sons, of Cambridgeport, Mass. There will be two 1,500 H. P. crossicompcund engines of the improved Green-Corliss type to be built by the Providence Steam Engine Co. To start with, there will be two direct-coupled generators, which number will probably be increased after the plant is in operation.

Langhorne Pa.—The Newtown, Langhorne & Bristol Street Railway Co., is considering different routes for the extension of its line from Langhorne to Newtown. The distance between the towns is four miles and the consent of all of the property owners with the exception of the Pennsylvania Railroad Co., has been secured for one of the routes.

Newport Vt.—C. S. Magloom, P. J. Farrel and others have applied for articles of incorporation for the Clyde River Electric Railway Co., to operate in Newport, Derby, Charlestown and Brighton, Vt. Capital stock $150,000.

New Rochelle, N. Y.—The Village Trustees have revoked the franchise of the Westchester Electric Railway Co., granted a year ago on the condition that work would be begun within a year. The trustees approved of the conditions and plans of the Larchmont Electric Co., and it is thought that construction work will be begun soon by the latter company.

Orange, N. J.—The South Orange & Maplewood Street Railroad Co. is an applicant for an extension of its road from its present terminus at the Valley road and Forest street to a connection with the Watchung branch of the Erie road. The route is through private property, the road simply asking the right to cross streets.

Oshkosh, Wis.—The Winnebago Construction Co. was incorporated on Dec. 9, with a capital stock of $90,000. It will succeed the Citizens' Traction Co. and will build an electric line in Oshkosh and later to Kaukauna. The site for a power house upon the river front has been purchased. Contracts were let on Dec. 11 for the power house and construction will begin immediately. St. Louis capitalists are behind the enterprise.

Pine Bluff, Ark.—The Pine Bluff Power & Transit Co. is being organized with a capital stock of $100,000 to build an electric road in Pine Bluff. Among these interested are W. H. Langford, S. Bloom, D. C. Bell and others.

Plattsburgh, N. Y.—A franchise has been granted to the Plattsburgh Traction Co., to build an electric street railroad on Court street in Plattsburgh.

Pontiac, Mich.—An electric road is proposed from Birmingham to Pontiac, a distance of seven miles. If the grading can be completed by next spring the road will be completed by next fall.

Port Huron, Mich.—An ordinance has been introduced into the City Council granting James B. Dyar, of Detroit, a 30-year franchise for an electric railroad from Detroit to Port Huron by the city of Mt. Clemens. The ordinance compels at least 10 trips each way every 24 hours and provides a forfeiture of the franchise for failure of running cars for 10 days. Construction is to be commenced by May 1, and the line completed by Nov. 1, 1897, barring strikes or other unforeseen obstacles.

Richford, Vt.—The Richford & Montgomery Electric Railway Co. has applied for incorporrtion to build an electric road in the towns of Richford and Montgomery. The capital stock is $75 000. Among the incorporators are S. B. Carpenter, L. C. Levans and W. S. Foster.

St. Clair, Pa.—Preparations are being made to build an electric road from Mahonoy Plain to St. Clair to connect with the lines of the Schuylkill Traction Co., and the Schuylkill Electric Railway Co.

Suffield, Conn.—The citizens of Suffield favor granting a franchise to the Springfield & Southwestern Street Railway Co., which has recently made a survey for an electric road through certain streets of Suffield.

Syracuse, N. Y.—Twelve miles of electric road are to be constructed by the Syracuse & Suburban Railroad from South Salina street, Syracuse, to the village of Manlius. The construction work will be begun as soon as possible.

Tiffin, O.—Right of way has been secured by Mr. Clark Rude over the greater part of the route of the proposed electric road from Sandusky to Bellevue, Monroeville and Norwalk.

Wareham, Mass.—Press reports state that a company has been organized and the route surveyed for an electric road, from Provincetown to Wood's Holl, starting on its southern shore and connecting the extremity of Cape Cod, Dennisport, Hyannis, Yarmouth and Falmouth. The contemplated line then runs north to Buzzard's Bay, connecting with the electric road to New Bedford, via Mattapoisett and Marion.

Westville, Conn.—Surveys have been made for an electric road from Westville to Naugatuck, running through Woodbridge and Seymour, a distance of about 15 miles. The estimated cost is $20,000. F. Tyler, Dr. T. H. Russell, D. N. Clark, Robert Payne and others are interested. No company has been formed, but it is believed the Legislature will be asked to give a charter for the road.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—Counsel in the case have agreed on Jan. 10 as to to the date for hearing the suit instituted against the Receivers to enforce payment of the dividends on the first preferred stock of the company. The holders of the first preferred stock contend that it is a first lien on the property, and a perpetual dividend of six per cent. must be paid out of the gross profits of the company. Of the total issue of 30,000 shares, about 25,000 have joined in this movement. This includes the 9,811 shares owned by the Johns Hopkins University.

Chatanooga, Rome & Columbus.—This road is to be sold at public auction at Rome, Ga., Jan. 13, under a decree of foreclosure and sale made in 1894. The plaintiff in the case is the Central Trust Company, of New York. The conditions of sale say that no bid of less than $300,000 will be accepted. The sale includes 140 miles of road in Western Georgia, from Carrollton, Ga., to Chattanooga.

Columbus, Sandusky & Hocking.—The officers have just issued a memorandum report from Nov. 15, 1895, to June 30, 1896, and of the Receiver of the railroad from July 1, 1895, to Nov. 14, 1895, as follows:

	1886.	Changes.
Gross	$905,296	I. $77,141
Oper. exp	696,865	I. 18,566
Net	$208,431	I. $58,575
Rentals and taxes	101,170	I. 314
Surplus for int	$107,260	I. $57,694

The report says that business has not been what was hoped for, and the company has been unable to sell the first mortgage bonds with which it hoped to liquidate its indebtedness. This has made the management of its affairs onerous. It is to be hoped that this burden will soon be remedied and improved business improve the company's prospects.

Columbus Southern.—This road has been sold for $750,000 to J. R. Anderson and E. R. Williams for the Georgia & Alabama Railway Company. The Columbus Southern extends from Columbus to Albany, Ga., and intersects the Georgia & Alabama.

Illinois Central.—Income from traffic for the four months ending Oct. 31 is reported as follows:

	This year.	Last year.	Inc. or dec.
Miles oper.	3,127	3,127	
Gross earn	$7,474,467	$7 265,256	I. $209,211
Oper. expen. & taxes.	5 321,240	4,776,395	I. 544,845
Net earn.	$2,153,227	$2 488 861	D $335,634

The gross receipts from traffic for the month of November, 1896, are estimated at $1,871,691; the receipts for November, 1895, were $2 157.388, an estimated decrease on the same mileage of $285,697.

Long Island.—President Baldwin, in answer to inquiries about the reports concerning the financial condition of the company, made the following statement last week: . . . A very careful examination of the books and operating accounts of the company has been made under my supervision by a competent public railroad accountant. A revision of the accounts for the last eight years, based on very conservative lines by transferring from improvement account to expenses a large amount of expenditures which did not add to the earning capacity of the road, and by charging off all assets and accounts of even doubtful nature, shows that the company has earned its fixed charges of every description, as well as a large surplus for dividend account. During this same period $4,500,000 has been expended in improvements to the property, and the road is in a much more highly developed condition to handle its business than ever before in its history. The earnings of the road for the last two years, however, have reflected the general business conditions, and as a strictly local line, with large fixed train service, it has been unable to reduce expenses in proportion to the reduction in gross revenue. The road will be able to handle an indefinite amount of additional passenger business without additional train service or expense, and it is confidently expected by the directors that with general improvement in business conditions the revenue of the company will return to its former basis. The directors are now maturing plans for a rapid transit entrance into New York City.

Murphysboro.—This road, extending from Pendleton to Murphysboro, N. C., now operated by the Seaboard Air Line, is to be sold under foreclosure this month. The future of the line is in considerable doubt, as it is announced that the Seaboard Air Line will not purchase the property.

Philadelphia & Reading.—The Attorney-General of Pennsylvania is investigating the legal standing of the charter of the Reading Company, under which the Philadelphia & Reading Railway and Coal and Iron Companies propose to combine their interests under one ownership.

Pittsburgh & Connellsville.—The Receivers' certificates, aggregating $650,000, for the improvement of the road, have been purchased by an English syndicate, through the Baltimore Trust & Guarantee Co. The entire amount was bought from the Receivers at par. The certificates bear interest at five per cent. and are to run three years.

Providence & Worcester.—The shareholders last week voted to authorize the issue of $1,500,000 bonds to take up an equal amount of six per cent. bonds maturing Oct. 1 next.

Quincy, Omaha & Kansas City.—In the foreclosure proceedings instituted in the United States Circuit Court, under the first mortgage, an order was issued by Judge Thayer, at St Louis last week, ordering the sale of the road, which will take place at St. Louis on a date to be decided upon later. The application for foreclosure was made by the trustees of the mortgage, Theodore Gilman and W. W. Jacobs, but the form of decree desired by the trustees was objected to by the attorneys of the junior securities, who asked that the Judge fix $2,000,000 as the minimum price for the property. Judge Thayer, however, fixed $330,000 as the upset price.

Sedalia, Warsaw & Southwestern.—This road, which has been operated for the past 2½ years by Receiver T. F. Mitchum, will again be operated as a branch of the Missouri Pacific. The Receiver was appointed on the suit of the stockholders, who contended that the road was not being operated to the best advantage by the Missouri Pacific Under the agreement between the stockholders and the Missouri Pacific the pending litigation, which will come up for a hearing in the State Circuit Court shortly will be dismissed.

Terre Haute & Indianapolis.—To correct the various statements which have followed the receivership, President McCrea has made a long statement of the company's affairs, in which he says that since his election the situation has developed as follows: First—That the revenues of the leased lines had not been and were not sufficient to meet the obligations of the leases, consequently the deficiency had to be supplied out of the net revenues of the Terre Haute & Indianapolis. Second—That, notwithstanding the Terre Haute & Indianapolis had ceased paying dividends in 1894, its revenues were not sufficient to meet the deficiencies of the various leased lines; in fact, not sufficient to pay the taxes, rentals, interest, etc., that had to be taken care of. Third—That there was a floating debt of several hundred thousand dollars and a necessity for quite a large expenditure to place the main line in a condition to do business economically and meet the active competition to which it is subjected. This condition was the result of a too economical application of material consequent upon the struggle to keep up the various lease obligations.

The depressed condition of the times emphasized the situation, and in order to be fair to all and not apply the money belonging to one leased line to the benefit of another, the management decided to set aside as separate funds the net earnings of each leased line and apply it to the payment of taxes, rentals and interest, using the net earnings of the Terre Haute & Indianapolis in the same manner and applying any surplus either to a reduction of its floating debt or supplementing the above-described funds, as the case might seem to justify. As a result of this policy a default in interest occurred in these bonds of the leased lines, and the bondholders of the Terre Haute & Peoria, a line that has cost the lessor company since the lease, three years and nine months, nearly $350,000, petitioned for a Receiver for 30 per cent. of the gross receipts, due under the lease, or if upon the showing of the statements asked for under the petition it became evident that the Terre Haute & Idianapolis was insolvent, a Receiver for the property be appointed.

In view of the fact that the Terre Haute & Peoria was not earning its expenses and rentals, it would be unjust to other creditors of the Terre Haute & Indianapolis to make that company a preferred creditor, and, as the Terre Haute & Indianapolis was unable to meet its various liabilities, there seemed but one course to pursue, viz., to prevent preference of one creditor over another, and, therefore, they offered no objection to the petition to put the property in the hands of the Court.

Union Pacific.—A plan for the reorganization of the six per cent. collateral note trust was published this week, the main points of which are the proposal for the organization of a new company to acquire under foreclosure the collaterals held in the Union Pacific note trust of Sept. 4, 1891. It allots to depositors of notes par in five per cent. bonds and 50 per cent. in the stock of the new company. The committee consists of John G. Moore and James W. Alexander, of New York, and Edwin F. Atkins, of Boston. The considerations requiring this reorganization are outlined as follows by a member of the committee:

It is the purpose to reorganize the trust notes in harmony with the reorganization of the Union Pacific Railway. The character of the securities is such that this method of reorganization is required to best preserve and enhance their value. They largely represent enterprises promoted by the Union Pacific Railway Co., or so related to it that the best results to both interests can only be obtained by such a harmonious reorganization. It is obviously to the interest of the note holders, as well as to that of the holders of all fixed obligations of the railway company, that the properties represented in the trust should not be scattered in ownership and administration, but should be kept together and administered with the best mutual advantage to the security holders.

The plan calls for deposits of the notes. As the notes are now two years overdue it is proposed, in view of the insolvency of the company, to cause an early foreclosure and sale of the collaterals held in the trust and their purchase by a new company to be organized under the title of the Union Pacific Securities Company. The amount of notes outstanding is stated to be $8,500,000; the new company is to issue 5 per cent. first mortgage, 25 year gold bonds to the amount of $10,000,000, which are to be exchanged at par for notes deposited under the plan, and are to be secured by the same collateral. The sum of $5,000,000 in stock is also to be issued to the holders of the old notes to the extent of 50 per cent. of the par value of their notes.

The remaining bonds, $1,500,000, are to be held in the treasury of the new company for the present.

J. P. Morgan & Co., trustees under the six per cent. bonds, have issued a statement stating that the Committee of Under the Trust Indentiture opposes the above plan of reorganization and are proceeding to liquidate the trust with a view to paying the outstanding notes and retaining any equity in the securities for the benefit of the railroad company or its successors.

Washburn, Bayfield & Iron River.—The suit against Bayfield County, Wis., this company and the Bayfield Harbor & Great Western, attacking the validity of the issue by the county of $240,000 railroad bonds, was heard in the state Court, at Ashland, last week. The Court found in favor of the defendants, and dismissed the complaint, and found the issue of bonds regular and valid, also that the transfer from Washburn, Bayfield & Iron River Railroad to the Bayfield Harbor & Great Western of a portion of the bonds was binding. The case will be appealed.

Wichita & Western.—The Receiver has been authorized to abandon about 40 miles of the western end of the line between Pratt and Mullinville, Kan., and to take up the rails. There are six stations on this portion of the line which will therefore be abandoned. The order was issued by United States Judge Foster on the application of the Receiver, who believes that being relieved of the responsibility for operating this portion of the road, the line between Wichita and Pratt, if put in good condition, could be made to pay expenses.

Electric Railroad News.

Boston.—At a meeting held on Tuesday of this week the stockholders of the West End Street Railway Co., of Boston, ratified the lease of the subway for 4⅛ per cent. the cost of the subway to the city.

Chicago, Ill.—A trust deed for $3,000,000 has been filed in the Recorder's office for the General Electric Railway Co. to the Title Guaranty Trust Co. as trustee for the State Trust Co. of New York. The deed is to secure an issue of bonds for the construction of the proposed underground electric road in Chicago.

A damage suit, based upon the recent litigations, was filed in the Circuit Court on Dec. 9, by which the General Electric Railway Co. seeks to recover $500,000 from the Chicago City Railway Co.

Lima, O.—The recent purchasers of the Lima Electric Street Railroad have elected the following officers: E. W. Moore, of Cleveland, President; Edwin Stone, of Bedford, Me., Vice President; C. Curry, of Lima, General Manager and Secretary, and E W. Moore, Edward Stone, M. A Gilbert, C. Curry and L. S. Catlin, Directors. The officers made an inspection of the road and suggested a number of improvements.

Minneapolis, Minn.—The St. Anthony Falls Water Power Co., owners of the power plant recently built near Tenth avenue south, have just closed a contract whereby the Twin City Rapid Transit Co. gain control of 7,000 of the total 10,000 H. P. of the plant. The railroad company will use the power for both its Minneapolis and St. Paul lines.

Nashville, Tenn.—The Nashville Street Railroad Co., which was sold in 1894 under foreclosure and reorganized under the name and title of the Nashville Street Railway Co., has passed into the control of a syndicate composed of C. M. McGee, of New York; Nathaniel Baxter, Jr., President of the Tennessee Coal and Iron Co.; A. M. Shook, Vice-President of said company, and Mr. Wrenne, of Nashville. The newly elected officers of the company are: T. M. Steger, President, and A. M. Shook, Vice-President, and among the directors are: C. M. McGee, James Swann, N. Baxter, Jr., and J C Bradford. The new company will improve the 50 miles of road which is capitalized at $1,500,000 and bonded for $2,000,000. The bonds, it is said, are all taken by the syndicate and are not on the market.

Niles, O.—The Mahoning Valley Electric Railroad Co. has increased its capital stock from $150,000 to $1,500,000.

Seattle, Wash.—The entire property of the Seattle Consolidated Street Railway Co., consisting of 35 miles of road, with rolling stock, power-house, etc., was sold under foreclosure on Dec. 1 for $139,601, which amount represents the claims of the first mortgage bondholders. The total indebtedness of the company exceeds $500,000.

TRAFFIC.

Traffic Notes.

The Hamburg-American Steamship Co. has discontinued the regular line of steamships to Galveston, which was put on some months ago.

The Joint Traffic Association has approved the action of the roads west of Buffalo and Pittsburgh in issuing 5,000-mile tickets. The tickets must bear the photograph of the bearer, and, according to the resolution, the rate may be $100 net. Nothing is said about a rebate.

The Grand Trunk and the Canadian Pacific have made an arrangement for joint passenger tickets in consequence of which the ticket offices of the two roads, outside the stations, will be closed in 32 towns. In 29 other towns the offices of the Canadian Pacific only will be closed.

The pass agreement seems to have had a very chilling effect in Colorado as well as in some other places—if we may judge by the heading in a Denver paper. It says:

> To pay fare or walk it,
> Is the alternative pass fiends will have next month
> The new agreement is airtight and ironclad,
> And the passenger agents will part company with Ananias on Jan. 1, 1897.

A Louisiana paper states that the Louisville, Evansville & St. Louis is out of the Cumberland Gap Dispatch Fast Freight Line, and that west of Louisville the freight of this line will now go over the Louisville, Henderson & St. Louis. The account carries the impression that the Louisville, Evansville & St. Louis has been kicked out by the other members in the line, because they think it does not give them a proper share of its eastbound business.

The Seaboard Air Line has filed a complaint with the State Railroad Commissioners in North Carolina, South Carolina and Georgia, alleging that the Southern States Passenger Association unjustly discriminates against it by refusing to join it in a personally-conducted excursion to Florida, to leave Raleigh on Jan. 10. The complaint states that, at the fares proposed, this excursion would pay better rates than excursions which the association roads are running from northern cities to Florida.